FEB. 13
1958

ENGINEERING NEWS-RECORD

EIGHTY-FOURTH YEAR OF PUBLICATION

★ ANNUAL REPORT AND FORECAST ★

After the Rest-Stop

Construction's prime customer, the U. S. economy, is enjoying a rest-stop more than it is suffering a recession. Refreshed and refueled, with its inflationary temperature back to normal, it will be more fit than ever to make the grades and take the curves on the road to higher living standards for all in a peaceful and changing world. That is the promise for 1958, and it holds high hopes and poses new responsibilities for the construction industry.

Fortunately, never before in history did the construction industry have so many assets to apply to its task of servicing an expanding economy. Its manpower and management are equal to any demand. In materials and equipment, it is rich beyond compare. It has new techniques and talents tailored to use them. For the first time in a decade it can look forward to a slowdown in the rising cost trend. And not only can it thus make its dollars go farther than before, it can borrow the dollars that it needs more cheaply.

Favored by such conditions, the construction industry has little reason for discouragement in the year ahead, a statement that is bolstered by fact after fact from this 83rd annual report and forecast.

Continued on page 47

HIS ISSUE
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(A)

(B)

Extending from the bottom of this 40-foot fill is an Armco MULTI-PLATE® Pipe, 12 feet in diameter and 586 feet long. It is just east of the interchange for the junction of new U.S. Routes 25 and 40 in Ohio. Photo (A) is site at beginning of job; (B) interior of pipe, designed in 1 gage with a 5% ellipse.

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* * *

Corrugated metal drainage structures comprise just one group of the more than 30 Armco all-metal products for construction in highway, railway, municipal and industrial applications. Fill in and mail coupon for typical durability data. Armco Drainage & Metal Products, Inc., Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

Forty-eight years ago, this twin Armco 30-inch-diameter culvert was installed in California. It is still in good condition today.

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On road jobs like this one, the TS-260's short turning radius—a complete turn in only 30 ft—eliminates need for extra travel-to-turn areas, shortens cycle time, gets job done faster, easier.

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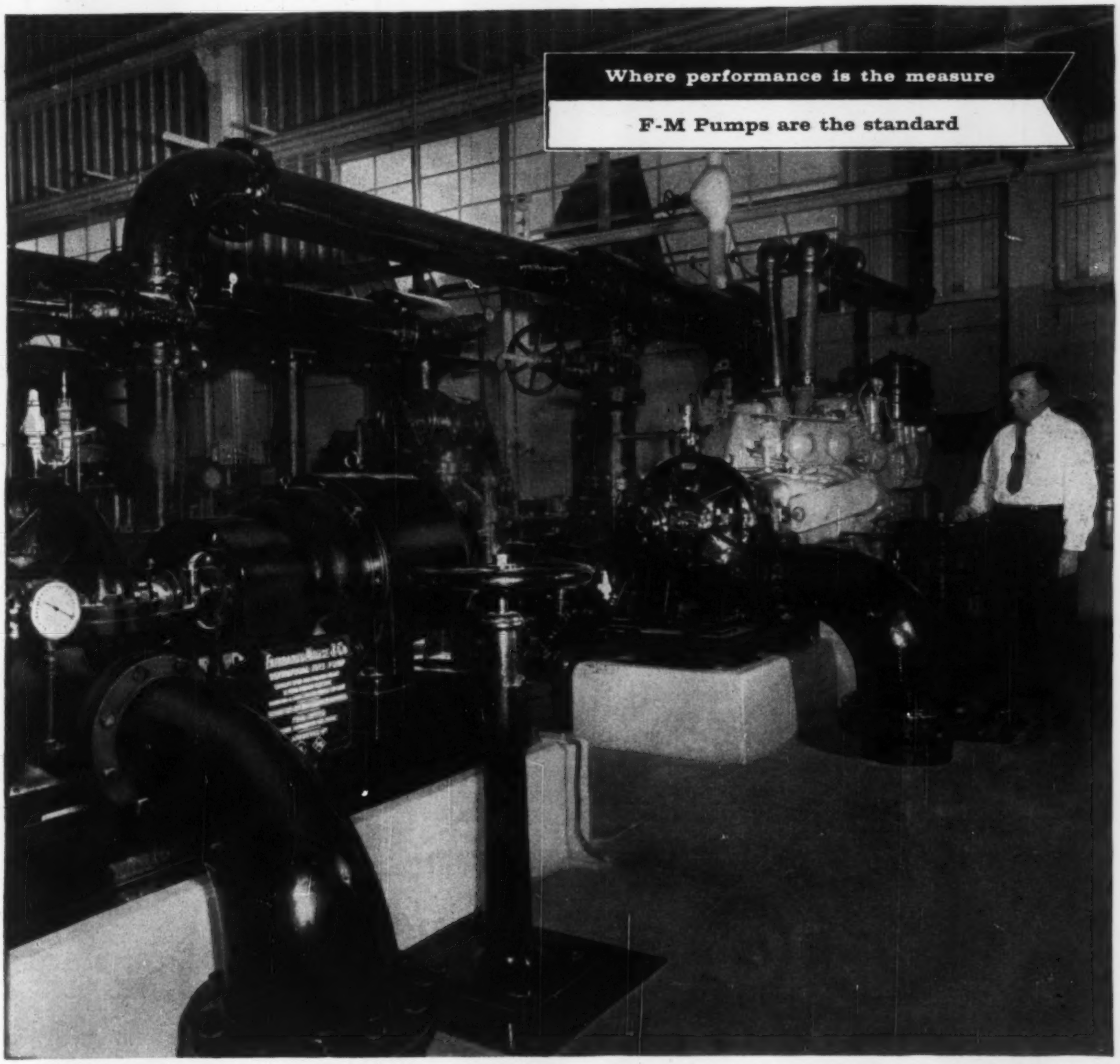

Mr. George Biggar, plant engineer of Ford Motor Company assembly plant at Mahwah, N. J., checks Fairbanks-Morse fire pumps (1500 gpm. motor-driven pump in foreground, 2500 gpm. diesel-driven pump near Mr. Biggar).

Ford guards against fire at giant new plant

To protect one of the world's largest auto assembly plants against fire, Ford Motor Company depends on these two Fairbanks-Morse fire pumps. As the heart of an extensive system, the two F-M pumps provide defense in depth, one pump backstopping the other.

This installation is typical of the great care and planning by modern industry to prevent the catastrophe of fire. Call in your F-M Sales Engineer for expert assistance in pump specification. As builder of the world's greatest variety of hydraulic combinations, Fairbanks-Morse will provide the exact type, exact size pump you need for maximum dependability.

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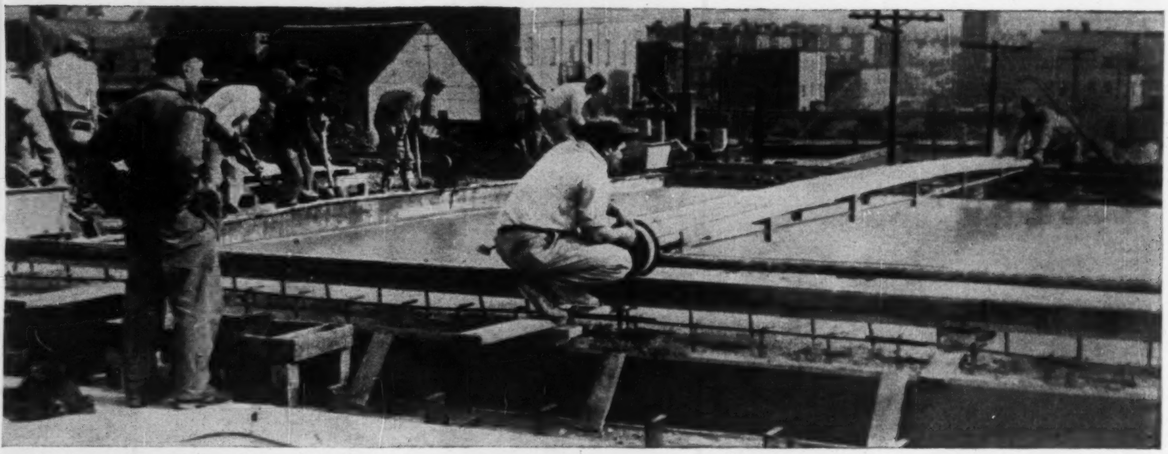
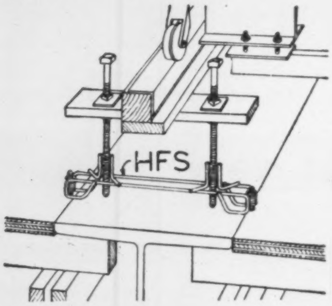


Brookfield Construction Company screeds three lanes at once.

Skillful screeding, Richmond supports, pay off in fast, accurate slab finishing

A new screeding technique developed by Brookfield's superintendent, Jack Sorensen, paid off handsomely on this elevated highway extension of the New Jersey Turnpike. An 800-lb., 36-ft., vibrating screed blade was used, with supporting angle-covered 3 x 4's held firmly in place every 7-ft. by Richmond Hanger Frame Screed-Rail Supports. This made it possible to screed three lanes in one operation. Besides gripping the rail with extra firmness, the Richmond bases permitted the heights to be set exactly—from the top—with simple screw-head adjustments.



Brookfield's new technique and insistence on Richmond Screed Supports are typical of the emphasis on proper slab finishing among progressive contractors. Good screeding means a lot more than producing a good looking slab. For, unless the surface is finished without dishes or highspots and with design level maintained, the slab will not drain properly and will not satisfactorily resist weather and wear. In order to maintain levels, screed rails must be accurately positioned and held, so that they will not move during pouring and finishing. That is why the construction industry is showing such preference for Richmond Screed Supports with their adjustability and extra strength.

Equally important to good screeding, is having rail supports that are exactly suited to the job and to the screeding equipment to be used. The Hanger-Frame type used by Brookfield is only one of the complete line of Richmond Screeds.

In both the Richmond Standard Series and the special Series D supports, there is a wide range of sizes, weights and models. There are Richmond supports for use with hand screeds and vibratory screeds, and adaptable to power equipment. There are also Richmond heads to match any rail, whether pipe, T-bar, or special shape.

Whatever the type or size, all Richmond screeding devices, form brackets, and form and curb bolts provide the extra strength that not only saves money but ensures a better job. A number of the Richmond supports are shown at right. You will find all of them, and all Richmond screeding items, fully described in a new handbook just published—along with the full line of Richmond-engineered concrete tying devices, anchorages, and accessories. For your copy, or for help on any specific type of concreting problem, write: RICHMOND SCREW ANCHOR COMPANY, INC., 816 Liberty Ave., Brooklyn 8, N. Y. or 315 So. Fourth Street, St. Joseph, Mo.

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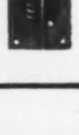
A FEW OF THE MANY TYPES OF RICHMOND SCREED-RAIL SUPPORTS

Richmond Adjustable Screed Chairs come in both the Standard (½" dia.) and D (¾" dia.) Series. Opposing legs that interlock and cannot spread or bend assure even distribution of load. Two new heights, 7½" and 10", have been added in the Standard Series. For unusually thick slabs, there are Richmond Special Height Screed Chairs.

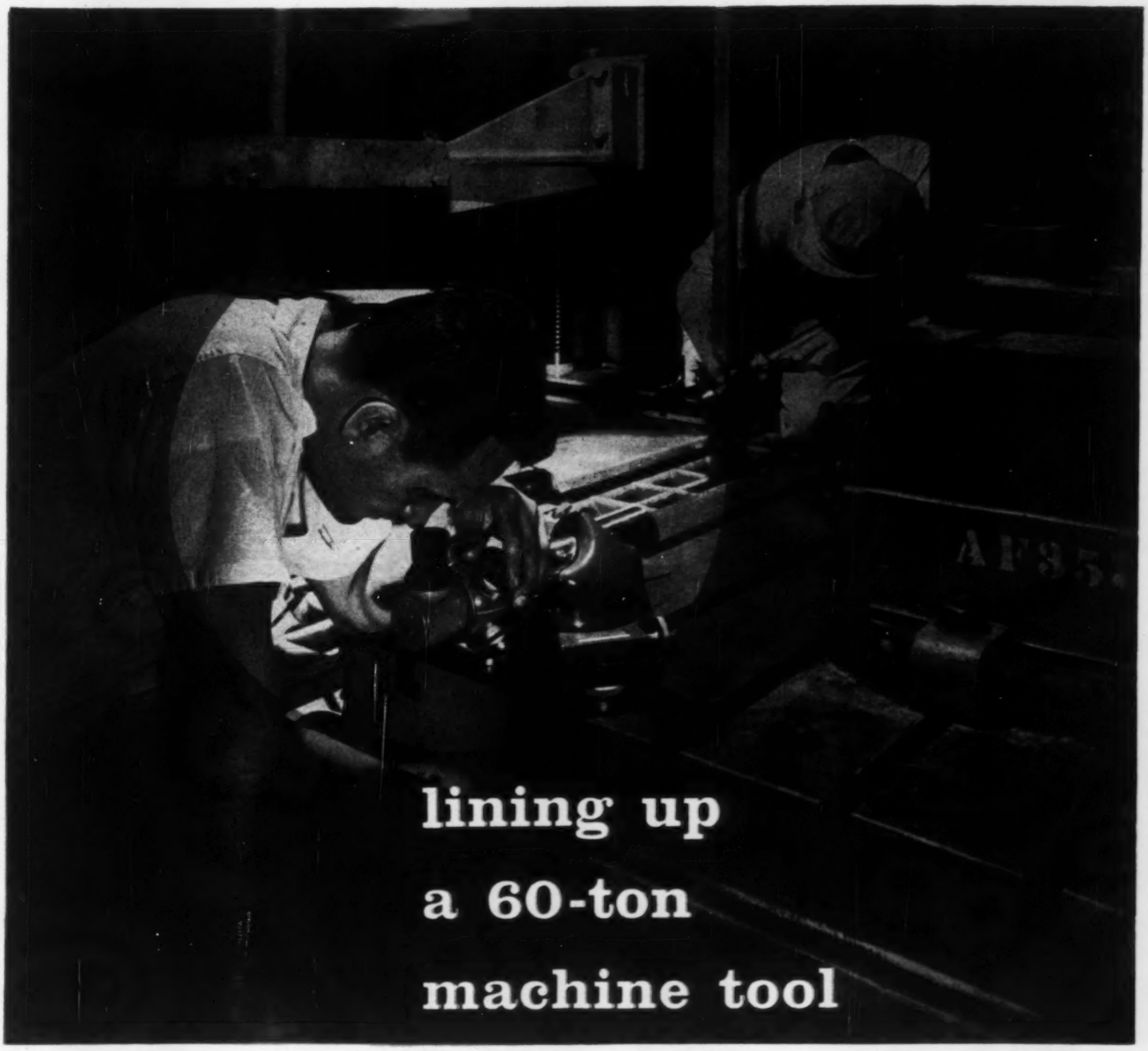
Richmond Offset Screed Chairs have built-in support to take cantilevered load when rail must be placed above surface, as, for instance, when reinforcing steel runs opposite to screeding direction. Richmond Offset Screed Head can be quickly adjusted from above with speed wrench; is double-ended for use with either pipe or T-rail.

Richmond Fill-Type Adjustable Screed Base, used when slab is over soft fill, provides stability with four extended legs driven into ground. Richmond Sub-Grade Stake (not shown) does similar job for heavier loads below grade.

Richmond-Sub-Grade Base provides 2"-high support with unequal bearing plates. It is used mainly with shorter screed bolts or as base for form bolt. Sub-Grade Chairs (not shown), 3½" to 18" high, are also available for soft sub-grade fill.



Richmond Form Bracket, can be nailed to a joist to support a screed bolt extending through the decking. May also be used in conjunction with a curb bolt to support and position a curb form. Consists of a ½" or ¾" coil welded to a steel plate equipped with four nail holes.



...BY TELESCOPE!

Precision three-dimensional alignment to 0.001 inch per foot was demanded in installation of eight 60-ton tracer-controlled milling machines at Alcoa's Cleveland plant. This precision had to be achieved in machines mounted on floating foundations.

McGraw mechanical erection specialists licked this problem with the use of specialized optical equipment imported from England — a micro-alignment telescope with auto-collimation. F.H.McGraw & Company is the first construction company to acquire and master these new precision tools.

Whipping tough problems of industrial construction or mechanical erection, within tight time deadlines, is a specialty of McGraw men, machines, methods and materials. A McGraw engineer would be happy to discuss your construction or installation needs with you — no obligation, of course.

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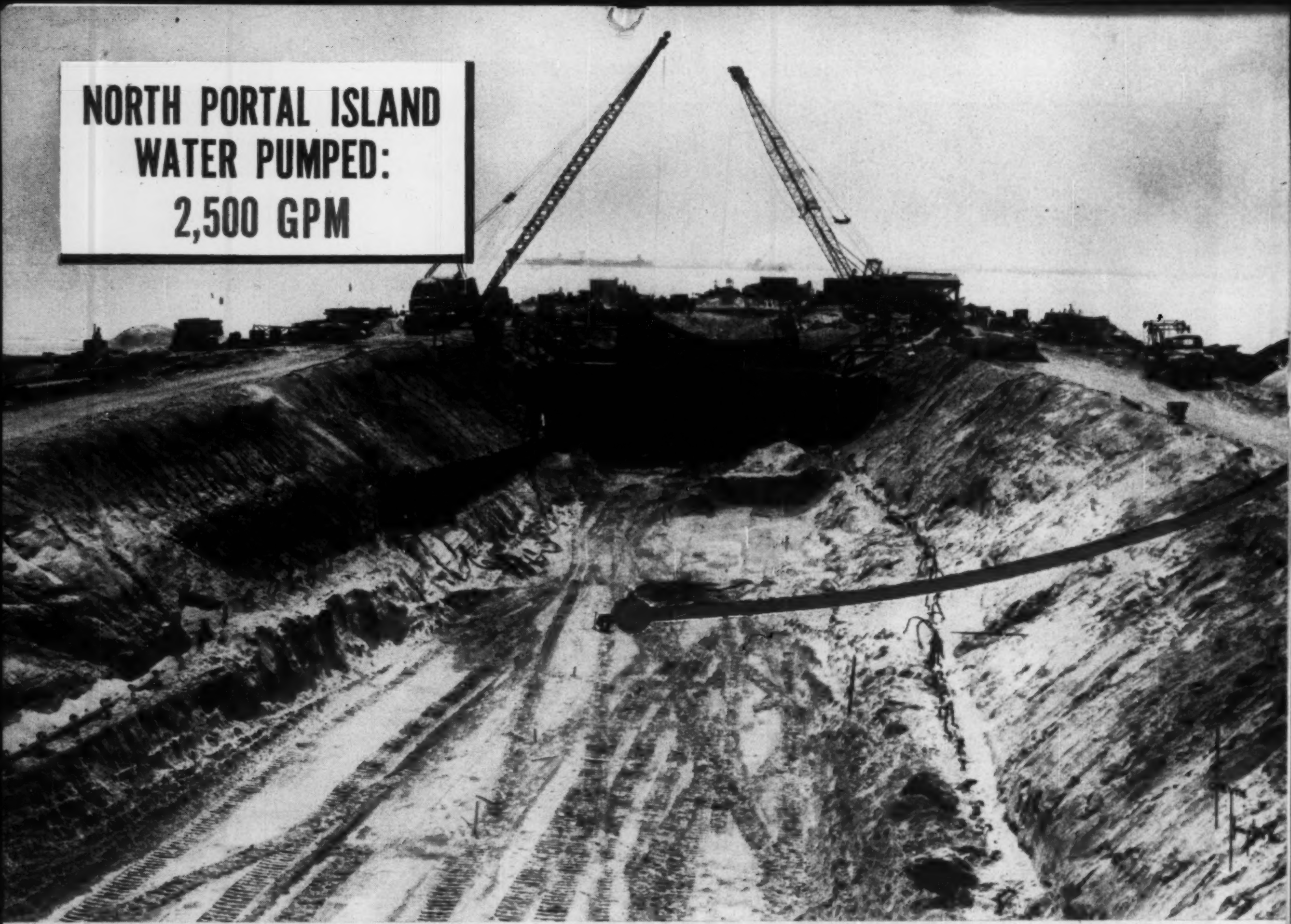
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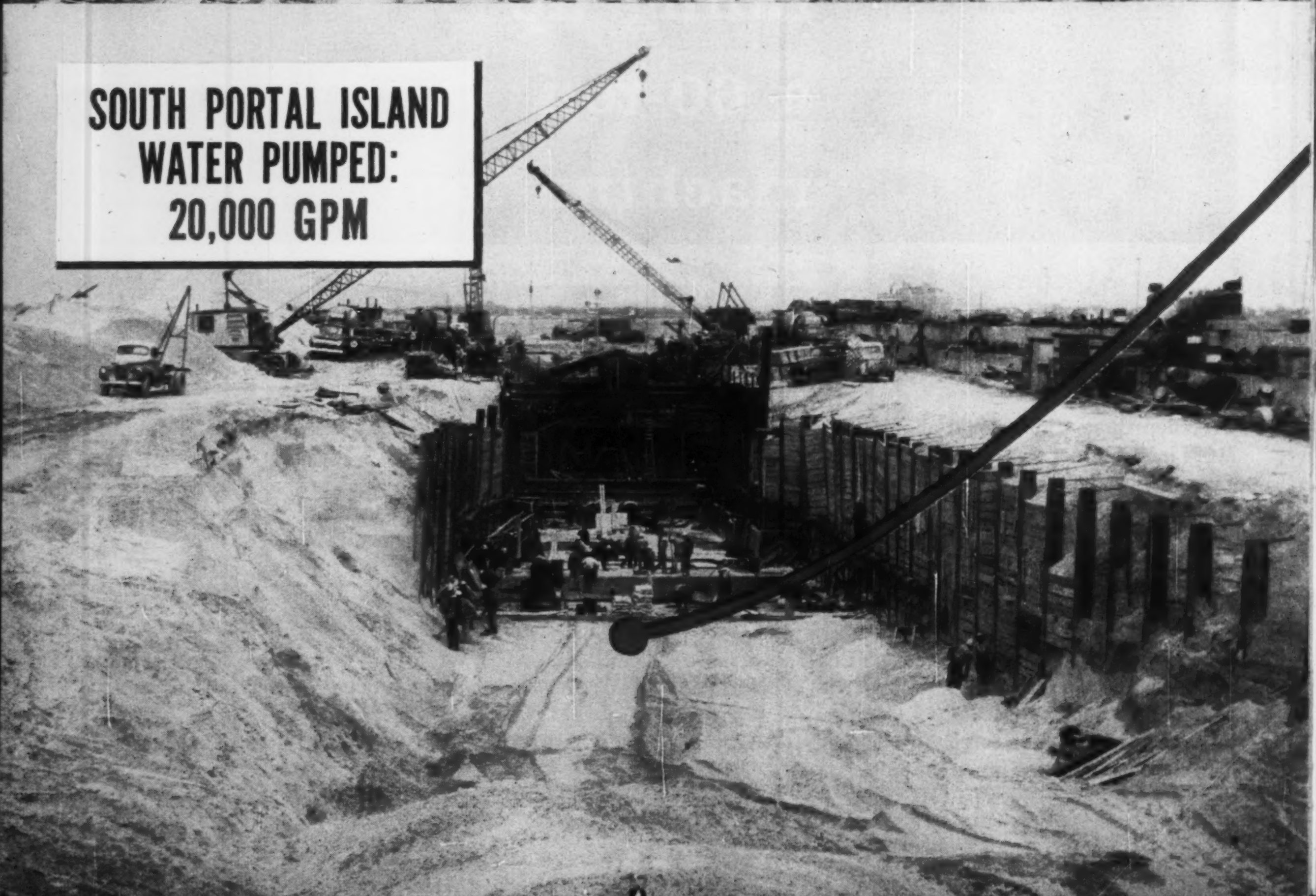
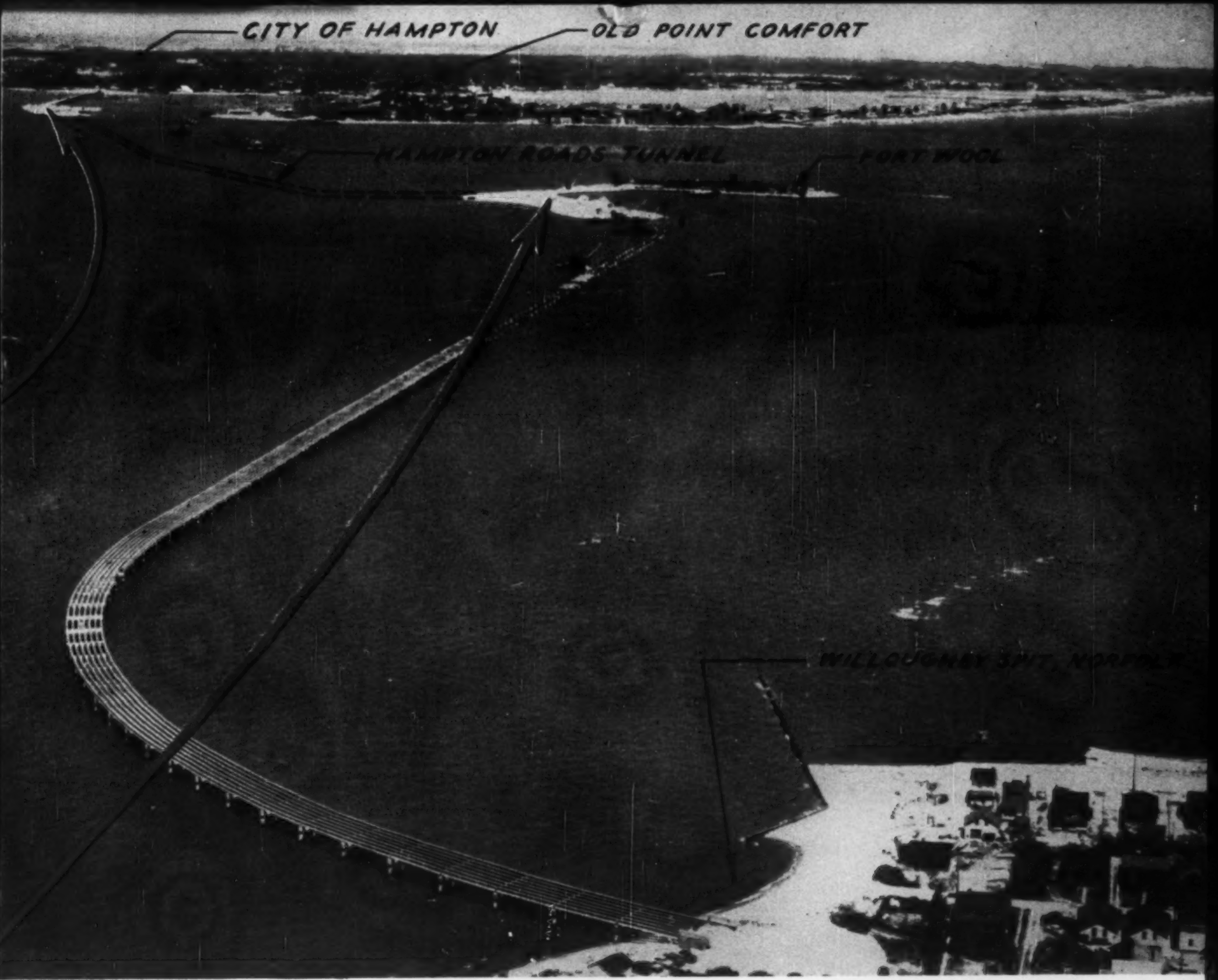
2,500 GPM


SOUTH PORTAL ISLAND
WATER PUMPED:
20,000 GPM



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Engineers: Parsons, Brinckerhoff, Hall & Macdonald, New York
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On each of the man-made islands pictured here a deep excavation is being made in the dry for the north and south approaches to the vehicular tunnel which the state of Virginia is constructing under Hampton Roads, between Hampton and Norfolk. Bridges connect the islands to the mainland. The tunnel, running between the islands, will be one and one-half miles long.

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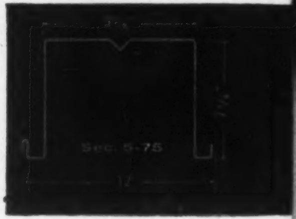

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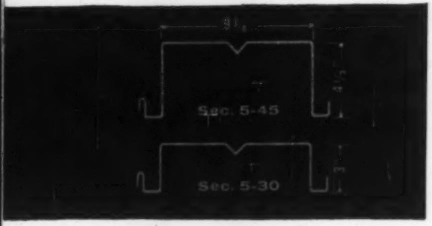

The basic cross-section of Section 5-45 and 5-30 is the same as standard long-span Section 5-75. Only the height changes.

. . for new roof design freedom

Robertson's Section 5 Long-Span Q-Deck has enjoyed wide acceptance since its introduction two years ago. It has filled the requirements for economical long spans in the construction of schools, supermarkets and other building types. Now, two new variations have been added to further increase cost-savings and add to design latitude.

You will notice from the drawings above that the basic cross-section is the same—only the vertical dimensions have been changed. The underside of the decks retain the same appearance making practical the combination of all three types for greater economy for varying load and span requirements.

As with all of Robertson's five Q-Deck types, the new Long-Span designs are weight-saving, strong, precisely made and easily erected. Lighting fixtures can be recessed, surface mounted or suspended. Any type of insulation (1" minimum) and built-up roofing can be applied. Write for literature which includes complete details, load and property tables.

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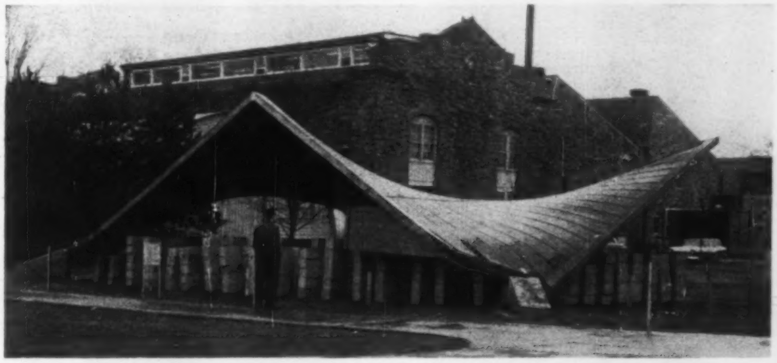


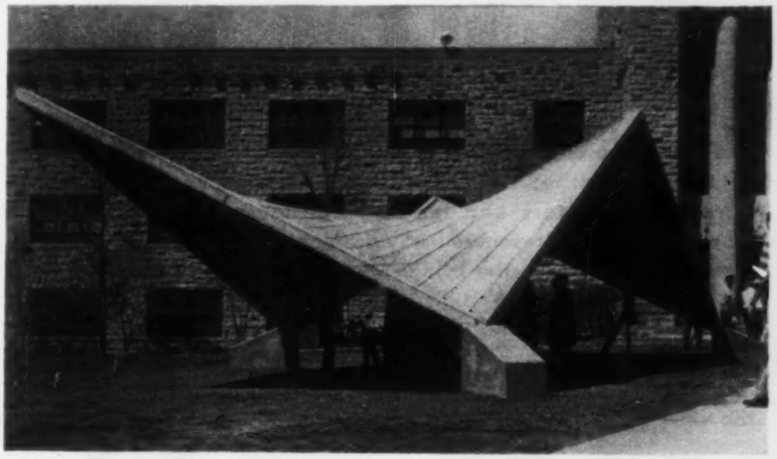
Photo Leaves Viewer in the Dark . . .

Sir—Your story on the test of a hyperbolic paraboloid by the University of Kansas (ENR Jan. 2, p. 26) was accompanied by a photo that has several of us baffled. Does this 20 x 40 ft hyperbolic paraboloid have three abutments as it appears?

Is that an arch in shadow above the observer's head?

Perhaps a plan view would clarify the arrangement.

D. J. Dirkse
Dow Chemical Co.
Midland, Mich.



. . . But Another Photo Throws Some Light

Editor's Note: Better than a plan view, here's a photo shot from a different angle with all three supports visible. Further clarification: Instead of being a single continuous hyperbolic paraboloid, the surface comprises two identical 20 x 20 ft shells.

They share a common edge beam, which runs from the gable peak at the midpoint of one 40 ft side (right) to the support located at the midpoint of the other 40 ft side.

The apparent "arch" that Mr. Dirkse refers to in the letter and photograph above is simply the silhouette of the saddle-shaped shell.

(Reader Comment cont'd on page 10)

Engineering News-Record welcomes expression of opinions from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance. Letters should be addressed Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

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This *Cedarapids Paver, surfacing Michigan's new Mackinac Bridge, is another fine example of teamwork between Continental Motors and leading builders of specialized machines. The job presented tricky problems, but the paver took them all in stride. In the bridge's length of nearly five miles are some 80 expansion joints, each with steel lips extending 1½ inches above the concrete bridge floor. Cedarapids' unique oscillating track rollers enabled the new paver to pass over the joints without disturbing the screed, and once under way, the work proceeded at 32 fpm.

*Product of Iowa Mfg. Co., Cedar Rapids, Iowa.

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Bridge Failure Avoidable

Sir—The sliding of the north anchorage of the Peace River Bridge in British Columbia 12 ft riverward (ENR Oct. 24, 1957, p. 26) due to 2,600 kips horizontal pull per cable, and the dropping of the north side-span into the river, completed the row of failures that has occurred in every part of this structure.

Soon after its opening to traffic in July, 1943, it was observed that individual strands of the open-type cables vibrated between the excessively spaced suspender clamps, which created visible kinks; 71 broken wires were counted in 1947. The Advisory Board on the Investigation of Suspension Bridges reported in 1952 that this bridge oscillated in wind with 10 deg double amplitude. In 1955, serious scouring necessitated the underpinning of one of the main piers, and in 1957, the bridge was wrecked because of anchorage failure.

These partial and complete failures could have been avoided by proper design. The writer indicated the causes for the wire breaks in the main cables (ENR Nov. 11, 1948, p. 110) and showed that an economical, torsionally rigid, suspended structure could have been built.

The bridge contained ample materials for satisfactory construction. Steel sheetpiles were used for the cofferdams of the main piers, each of 4,000 cu yd of concrete. Each of the anchorages contained 7,500 cu yd of interlocked concrete blocks, forming cells filled with gravel. In view of the comparatively small cable pull and the sliding of this great mass of material, the inefficiency of the anchorage design and the lack of knowledge of the foundation characteristics became apparent.

In the span range of this Alaska Highway bridge, anchorage design conditions decide the suitability of a suspension bridge and not erection considerations. The writer designed various such bridges and reported repeatedly on such bridge systems that possess the erection advantages of suspension bridges, although they act on their supports as continuous girders or cantilevers in that they have only vertical reactions due to vertical loads. Recently discussed examples were my proposed designs in 1950 for a Hudson River Bridge (ENR Aug. 8, 1957, p. 11).

Improvement on the ways and means of handling publicly financed design is an immediate necessity.

Louis Baloc
Consulting Engineer
Binghamton, N. Y.

(*Continued on page 16*)

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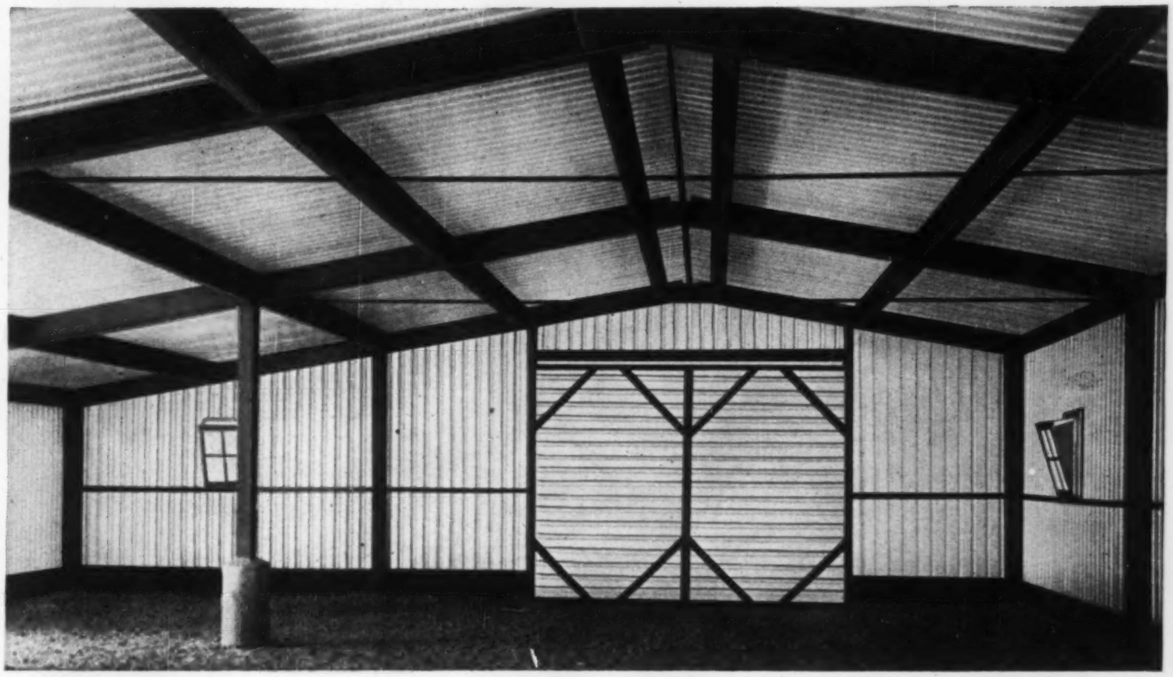

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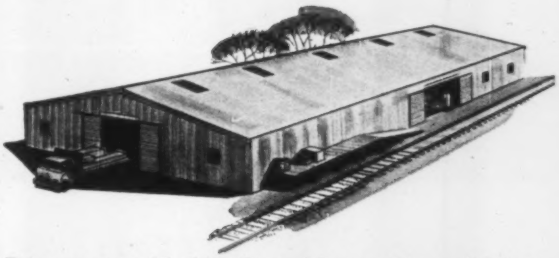

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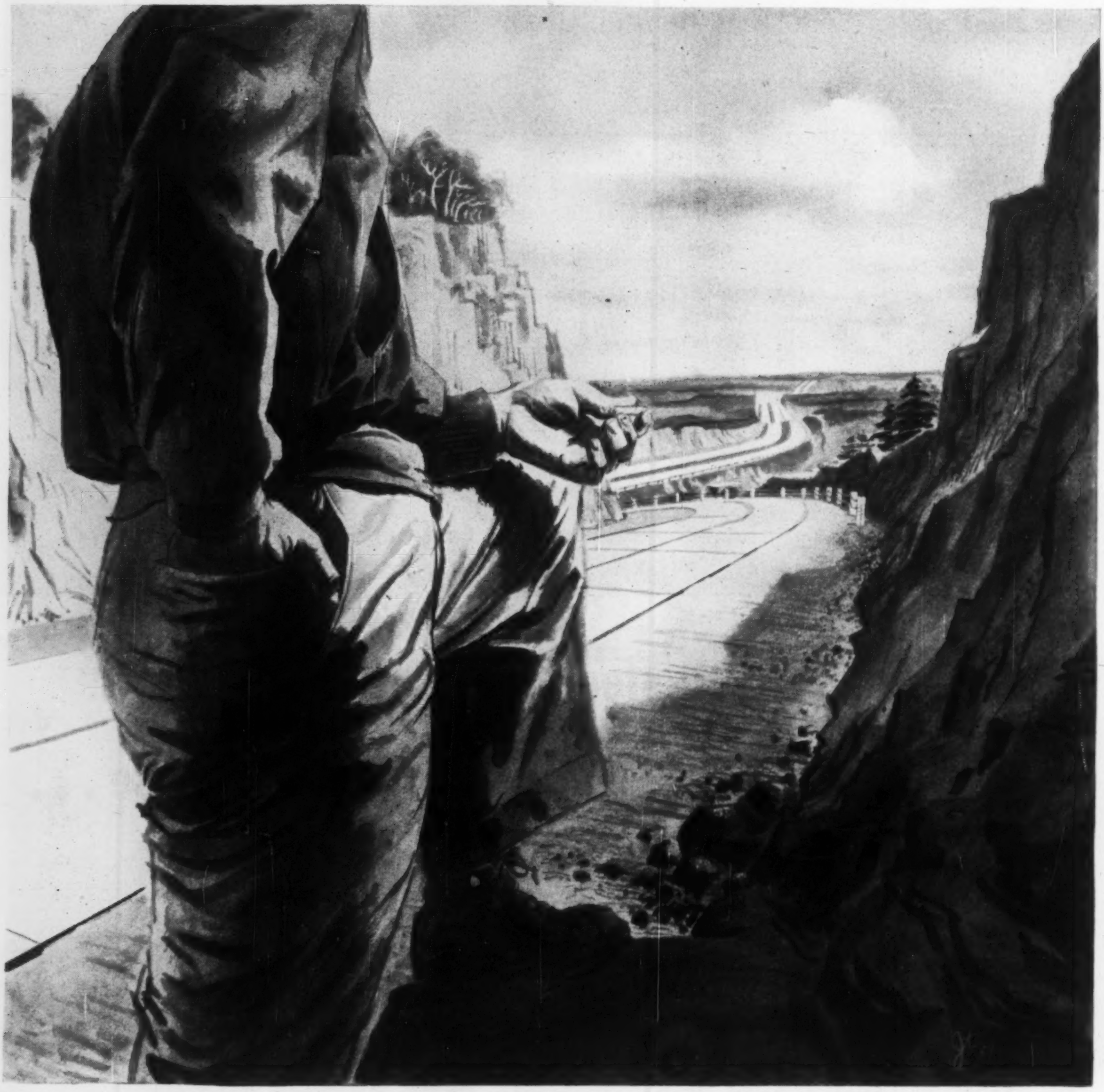

the profit you left behind

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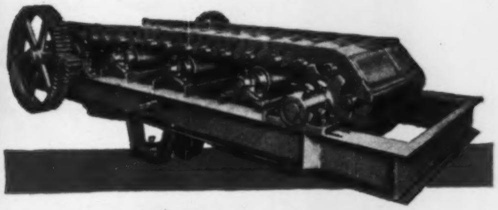

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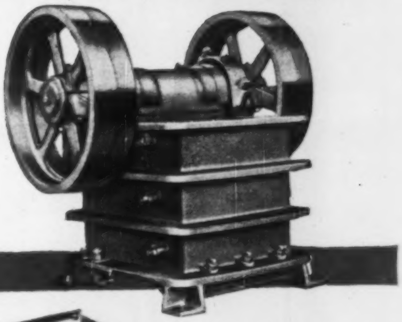
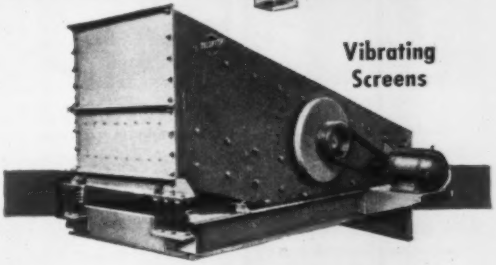
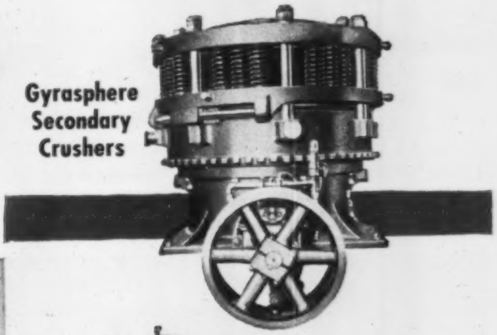


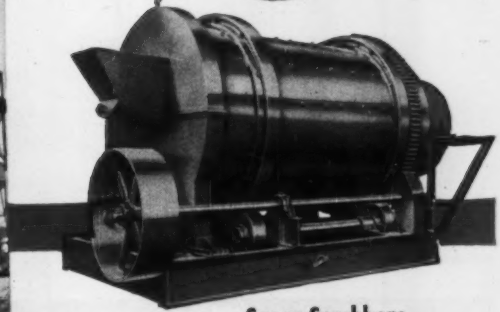
Jaw Crushers



Vibrating Screens



Gyrasphere Secondary Crushers



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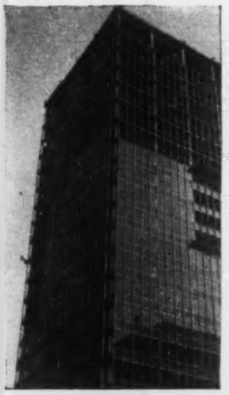

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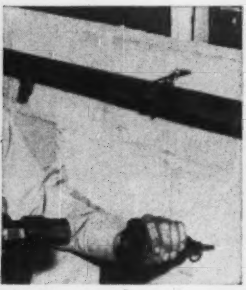
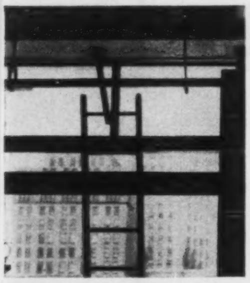
Harrington Electric Co.—electrical contractors—Installed floor conduits, ceiling lights, etc., using both SHURE-SET and RAMSET.



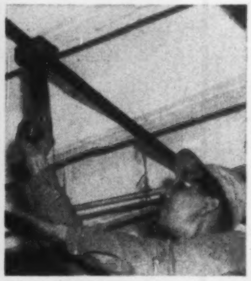
Feldman Bros. Co. — Steamfitters—Used SHURE-SET to anchor radiator chain supports.

Korner Sheet Metal Co.—sheet metal work—Installed air-conditioning ducts with RAMSET and SHURE-SET.



Builders Structural Steel Corp.—steelwork and valances—Used RAMSET to prevent thru-bolted trusses from swaying.

Johnson Service Co.—temperature controls — Twin temperature pipes anchored with SHURE-SET.



Gillen Acoustical Co.—acoustical ceilings—Kickers and hangers installed with RAMSET.

Home & Industrial Heating Co. — air-conditioning — Used RAMSET fasteners to hang heavy external louvers.

E. J. Brandt Co., Inc.—perimeter guards—Installed kicker plates and radiator guards with RAMSET.

Geo. A. Fuller Co. — general contractors—Anchored angle irons with RAMSET and door bucks with SHURE-SET.

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. . . BPR Replies

SIR—I have read Mr. Balog's letter concerning the Peace River Bridge with considerable interest since he has used this incident to attack the competence and professional integrity of those responsible for publicly financed bridge design.

From Mr. Balog's comments, one is led to believe that the Peace River Bridge has been on the verge of collapse since its completion in 1943, pointing to what he has termed "the row of failures that have occurred in every part of this structure." He appears to be under the impression that the collapse of the bridge was due to the relatively small cable pull on the anchorages.

This is far from the truth as observed by the writer, since the failure was the result of a deep seated slide of the river bank, the shear failure extending behind and below the anchorage structure. Therefore, it might be of interest to the profession to set forth a few facts concerning its history.

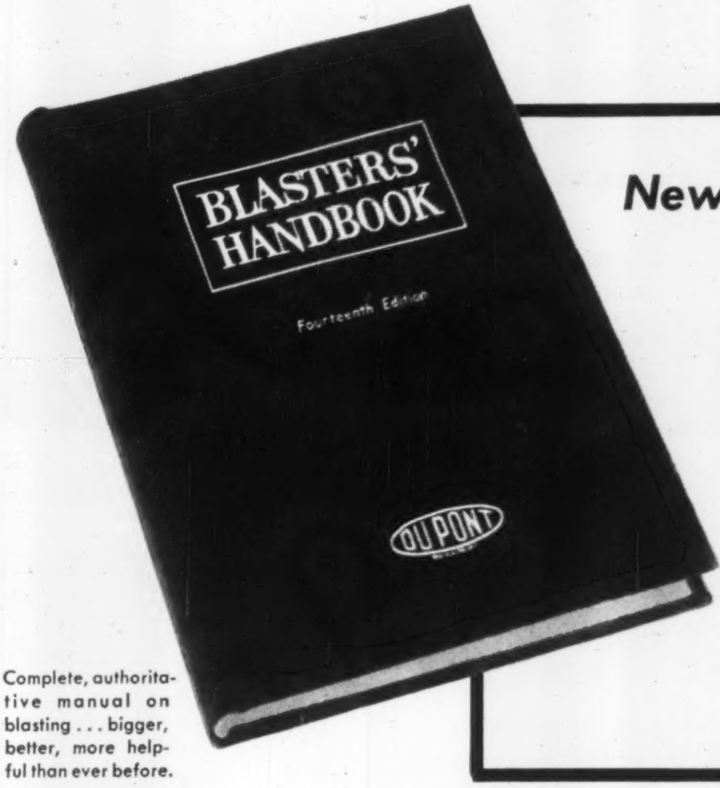
The Peace River Bridge was constructed as a part of the Alcan Highway during World War II, when this highway was built as a vital defense measure. The bridge was designed and built by the Bureau of Public Roads.

The crossing of the Peace presented, perhaps, the toughest problem on the highway. At flood, this river could be a raging torrent, so that a bridge having a minimum number of river piers was dictated. Studies were made of both cantilever truss and suspension layouts. Taking all things into consideration, including the fact that the suspension bridge could be completed in considerably less time than the cantilever truss, BPR decided to proceed with the suspension bridge.

Borings were made to determine foundation characteristics. These showed that piers and anchorages could be founded on a shale formation capable of supporting footing pressures. In construction, the pier and north anchorage footings were set into this material.

In the short period of nine months from the time it was decided to build the bridge of the suspension type, it was opened to traffic and this in effect, opened up the overland route to U. S. military establishments in Alaska, so that they were no longer dependent upon sea transport, subject to the harassment of enemy sea and air forces.

From the time of its completion in 1943, the behavior of the Peace River Bridge was closely observed by the en-



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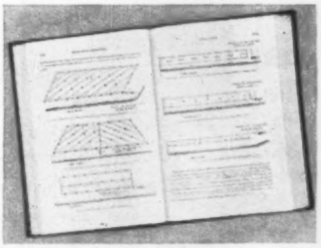

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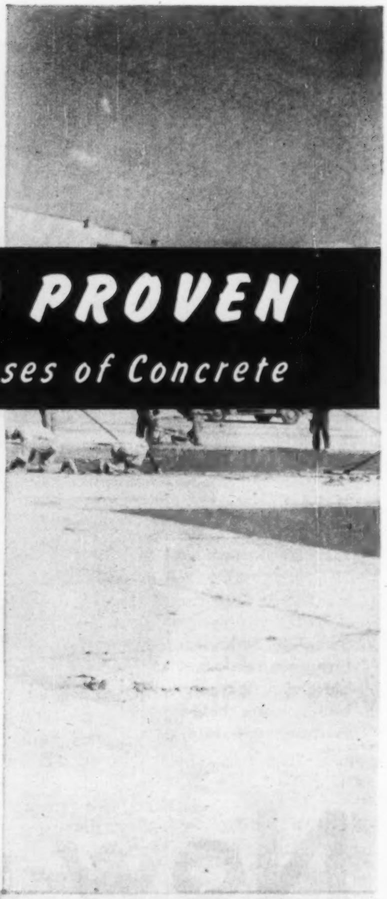

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Proven in the field . . . PDA insures the successful and economical placement of better quality concrete!

Dependable—YES! Proof positive from Government and private projects. Also backed by the world-known and world-respected PROTEX name!

Adaptable to any need . . . PDA improves any Pre-stressed, Slip-form, Light-weight, Tunnel-lining, Tilt-up or Lift-slab concrete project!

PDA's basic material is purified and desugared having been field tested and proven over past years giving you all the well known benefits—greatest water reduction—cement dispersion—maximum workability and durability—plus PROTEX economy and reliability.

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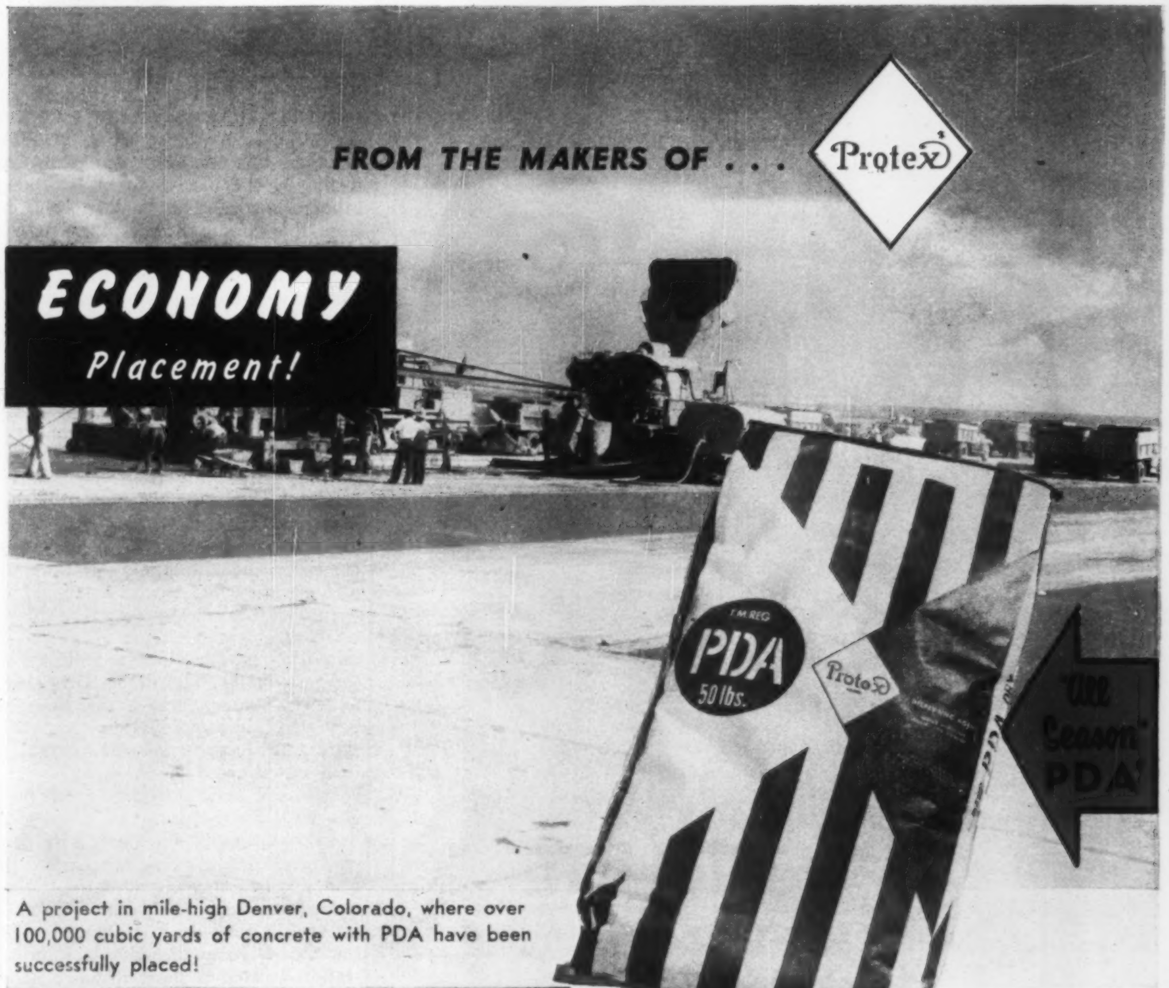

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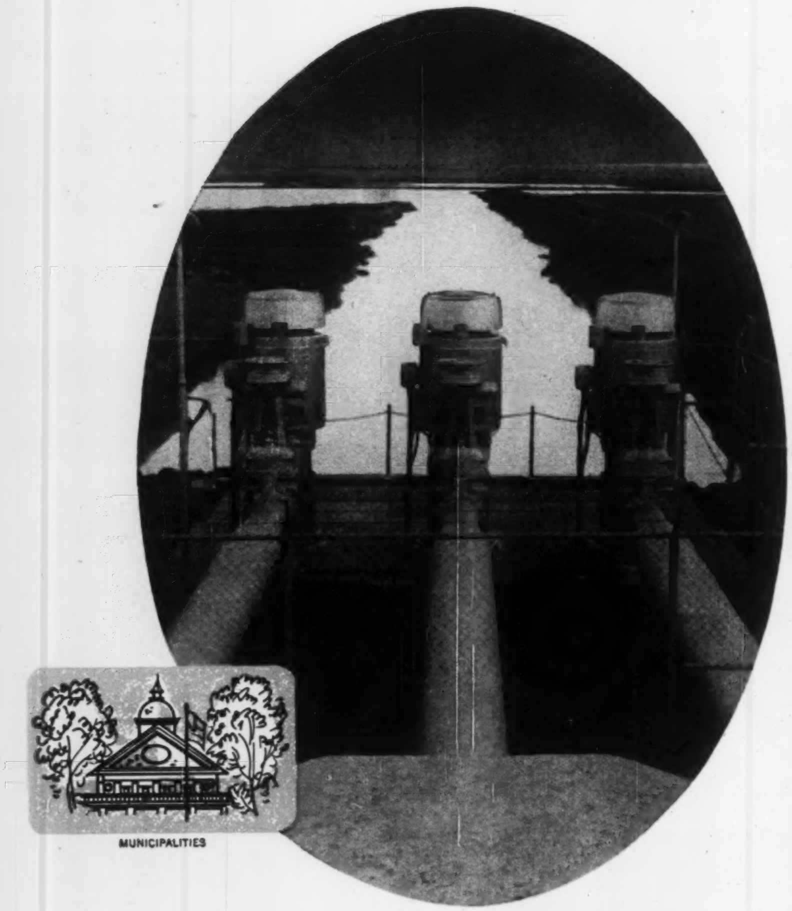

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gineers of the Canadian Army, who maintain the Alcan Highway, and the BPR. As Mr. Balog reports, it was found that there was some vibration in the strands of the open-type cables; however, this condition was easily corrected by the placement of additional cable clamps. The damage resulting from this condition was superficial.

This incident was reported in the engineering press at the time. Likewise reported was the behavior of the bridge in the wind, although no damage had occurred or was expected to occur from such movement.

Difficulty was encountered with the North Tower Pier in 1947. The upstream end of the pier was found to have been undercut several feet. This condition, resulting from the scouring out of the shale in which the pier was founded, was promptly and adequately taken care of by the Canadian Army Engineers by underpinning, and the bridge suffered no serious ill effects.

In October of last year, the North Anchorage was displaced as previously stated, as the result of a landslide in the river bank. The Peace River shale, in which the anchorage was founded, is a very hard material in its natural state, but upon exposure to air or moisture, deteriorates rapidly.

While it may be coincidental, there has been in the last two years great industrial activity on the north bank of the Peace River adjacent to the bridge, including construction of a natural-gas scrubbing plant. The water supply for this plant is obtained from the Peace River through a pumping station located a short distance above the bridge site. Water is carried through pipelines that pass in front of the anchorage and climb up the bank a short distance from the downstream side of the anchorage. The disturbance of the bank by this construction may have weakened the underlying shale sufficiently to cause bank failure and resulting dislocation of the anchorage.

Regardless of what causes might have contributed to the failure, the fact remains that the bridge has served as a satisfactory crossing of the Peace River for 14 years and failed as the result of an unforeseen foundation condition.

While the writer has not connected with the design or construction of the bridge, he has followed its behavior very closely for the last 11 years, and has made several personal inspections, including one in November, 1957, shortly after the failure occurred.

E. L. Erickson
Chief, Bridge Division
Bureau of Public Roads
Washington, D. C.

(Reader Comment cont'd on page 28)

IT'S A JOHN DEERE!

... the Ruggedly Built Crawler That Does a MAN'S Work at a BOY'S Pay

WHEN you're figuring costs, how many times have you wished for a rugged, compact, inexpensive power unit that would turn in a really BIG day's work at costs far below tractors you may now be using?

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Here is a tractor with multi-purpose equipment so adaptable there is almost no end to its uses . . . a tractor that's easy to transport, easy to handle, comfortable to ride, a compact, highly maneuverable tractor that gets in and out of tight places.

Best of all, it is economical any way you look at it. Initial cost? The investment is well within the range of the small-scale home-builder. A set of tracks for some tractors costs more than a complete "420" Crawler. Daily fuel costs? Fill the 10-1/2-gallon gas tank and you're all set for a full day's work. Maintenance? The name John Deere assures you the high quality of materials and workmanship that has been traditional with John Deere products for more than 120 years.

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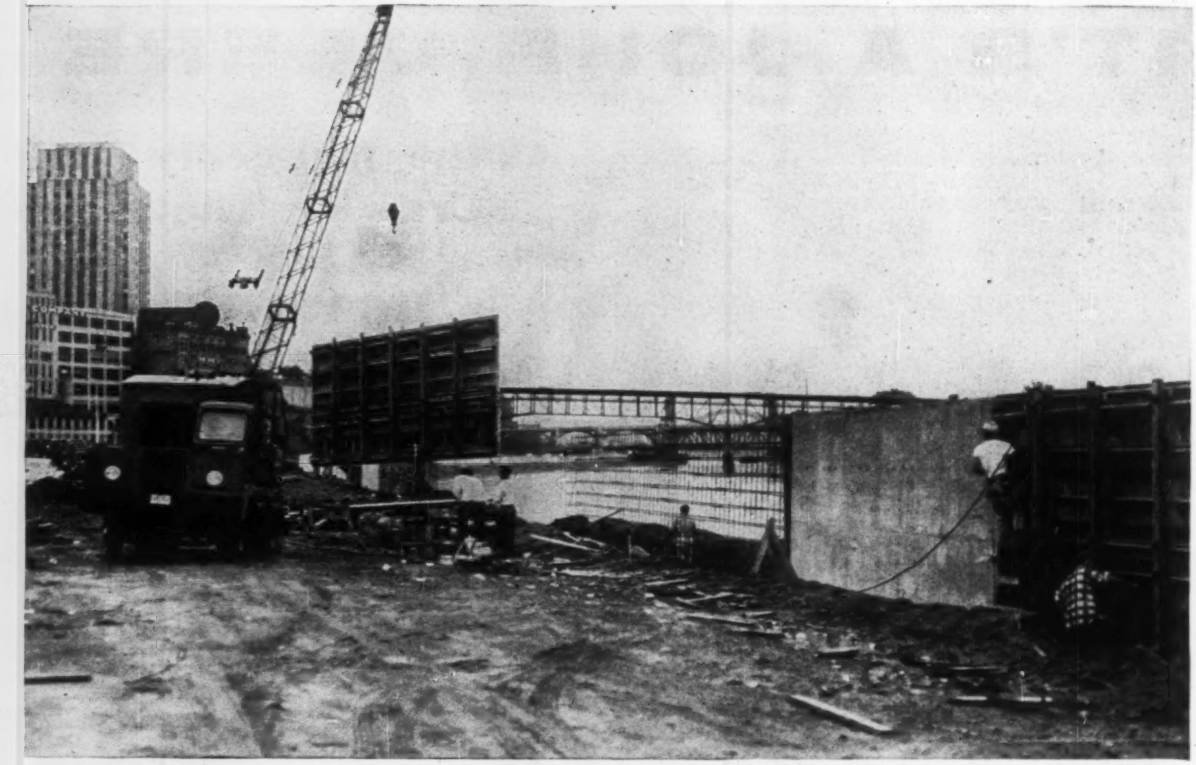
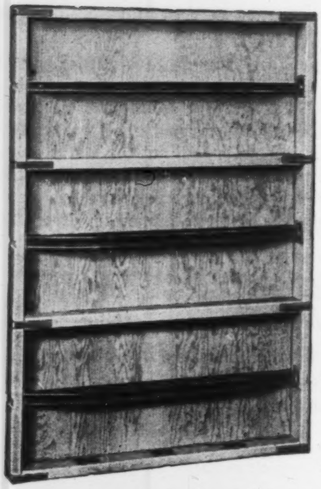


2,400 foot retaining wall poured prior to construction of Shepard Road, a main traffic artery in St. Paul, Minnesota.

70 feet of river retaining wall completed in one pour by GANG FORMING

SYMONS Wide Panel Forms



Symons Steel Strut Wide Panel Forms have 2 x 4 cross members to strengthen the panel and minimize deflection when pouring. Panels are built in 6' and 8' lengths and 30", 36" and 48" widths. Fewer panels per job are required with Steel Strut Wide Panels.

Pouring of a 2,400 foot retaining wall along the north bank of the Mississippi River in downtown St. Paul was accomplished with Symons Wide Panel Forms made up in gang sections of 10' x 24' and 15' x 24'. Panels 4' x 6' and 3' x 6' were used to form the sections.

Hurley Construction Company, St. Paul, contractor on the job, used only 5,400 square feet of Symons Wide Panel Forms. By gang forming, Hurley was able to speed construction and meet tight time schedule. 70 lineal feet of concrete was poured in one pour with a maximum pour of 700 lineal feet in one week. Walls were battered, 19 inches at the bottom and 12 inches at the top.

Handling of the sections with a crane was made easy by using a cable behind the top waler and a 3 by 8 plank permanently bolted about 18 inches from the bottom of the section. Walers and stiff backs were put on permanently.

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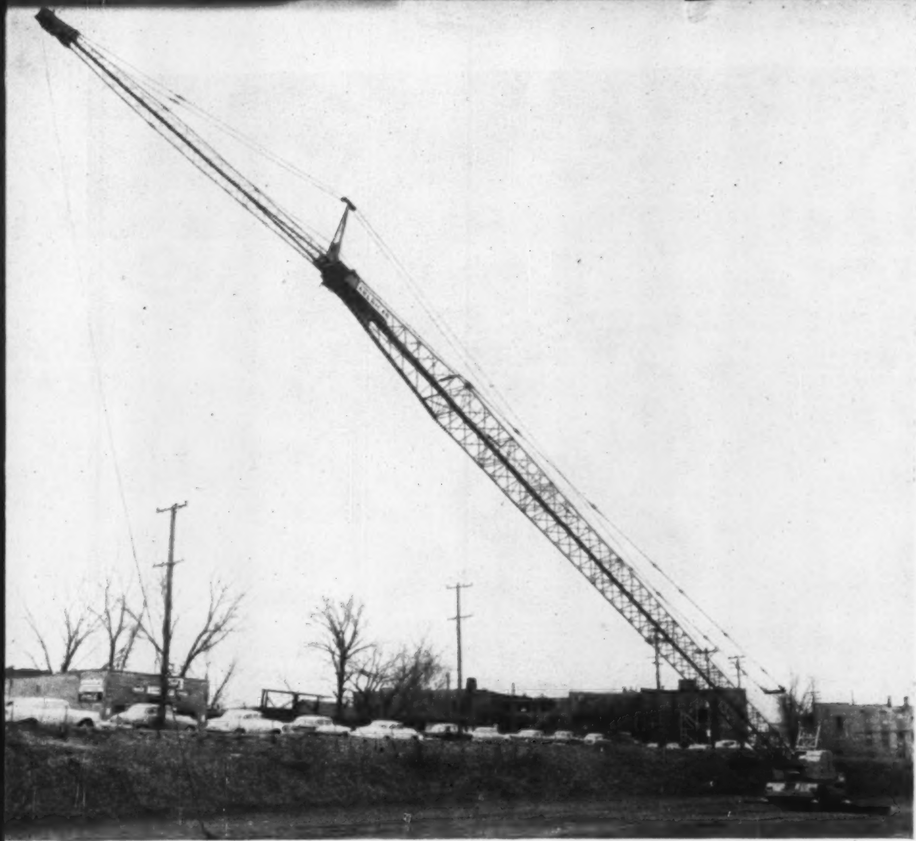

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American engineers have made 25 usually optional features standard equipment on the 599T to give you the machine you want. These important features add up to produce a truck crane that is tops in operating efficiency, job versatility and load handling safety. Analyze these features—see how they fit your demands for a real truck crane capable of sustained production now, and for countless years to come.

Typical of American's 599T advanced design features are the revolutionary new swinging outriggers and 5-point blocking system. They provide a stable base for full 360° swings with rated loads—even over the front.

Compare—you'll find that only the new 599T can handle so much boom—offer such great lifting capacities in its class. Your American distributor is ready to bring you all the interesting facts on this crane now proving its performance in the toughest test available . . . on-the-job!

ENGINE POWER LOWERS the gantry, counterweight and removes outriggers on the American 599T Truck Crane. Simple connections speed stripping—reassembly. The big 4-foot square boom sections are locked in place quickly with pin connections.

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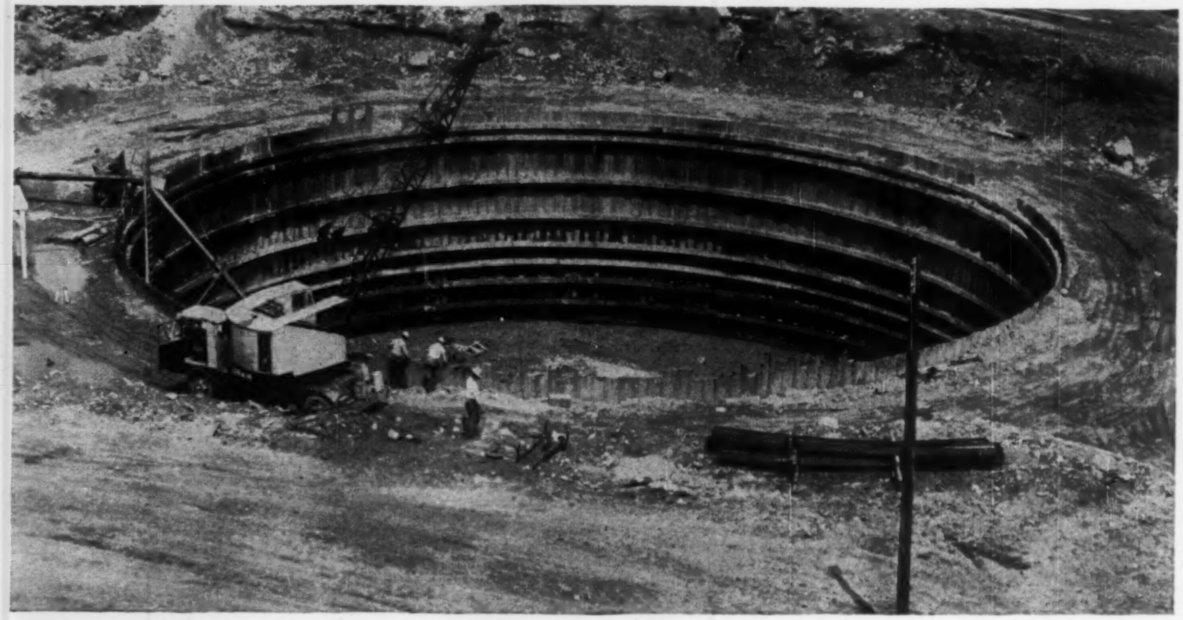


$100 million Allegheny County sewage project uses COMMERCIAL rings and ribs exclusively

The trunk sewer and treatment plant project currently being built for the Allegheny County Sanitary Authority to serve Pittsburgh and surrounding communities is both immense and unique.

NINETEEN MAJOR CONTRACTORS will spend more than three years excavating 1,200,000 yards of earth and rock. Thirty-three miles are in tunnel, thirty-four miles are open cut. The ultra-modern sewage treatment plant will serve seventy-seven communities. The huge project has many firsts to its credit, ranging from the method of financing to the method of sewage treatment. Two of these firsts involve specialized Commercial products.

SUNK IN WATER-BEARING SOIL on the banks of the Ohio River, the excavation illustrated above is the largest circular vertical shaft ever sunk without cribbing or basing. It is 100 feet in diameter, wide open and 120 feet deep. It will serve as a huge pumping station base at the terminus of the entire system. Sheet steel piling backed up with sectionalized steel rings specially designed by Commercial support the walls of the shaft. Made of 12" wide flange beams the rings are curved by Commercial and delivered at the site ready to bolt into place. They are sized for easy handling and placement. Bolt holes for joining the segments together are carefully matched. Erection is safe and simple.

COMMERCIAL STEEL TUNNEL RIBS support much of the record 33 miles of tunnel and provide the same kind of safe, sure, time and labor saving reinforcement. A good part of the difficult tunneling is through heavy rock and mixed face formations. Most of it lies close to the three major rivers which converge to make the famous Golden Triangle.

QUICK INSTALLATION of supports is a must because the hazard of cave-ins is constant. Accurate prefabricated curvature of Commercial tunnel ribs, their sure matched fit, and their convenient size and weight give solid protection, certain support, swift and easy installation.

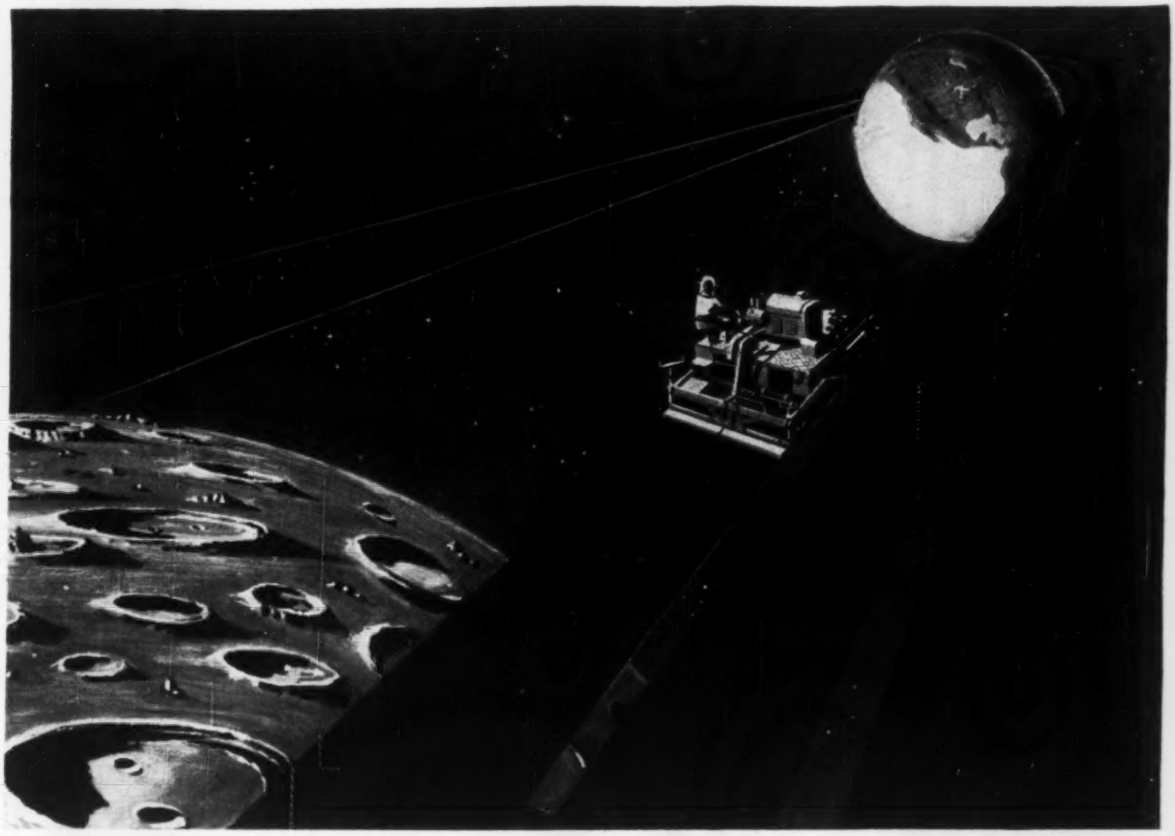
COMMERCIAL CAN HELP YOU with your shaft or tunnel support problem, regardless of size. For information without obligation, write to Dept. E-7. The Commercial Shearing and Stamping Company, Youngstown 1, Ohio.

COMMERCIAL
shearing and stamping

STEEL RINGS BY COMMERCIAL stabilize tremendous external pressure and keep this record 100-foot diameter shaft wide open to depth of 120 feet — half in rock.

COMMERCIAL TUNNEL RIBS support roof, protect the muckers and make good footage possible even where very heavy rock and mixed formations are encountered.

COMMERCIAL EXCLUSIVE SUPPLIER of all steel tunnel ribs to all five contractors for the entire 33 miles of tunnel in this gigantic sewage disposal project.



The 5th (s)trip to the moon has been started

By conservative estimates, the thousands of Barber-Greene Finishers throughout the world have started paving their second million miles. That is the equivalent of more than four trips to the moon. The current design of the Model 879-B is based on that experience.

Improving the Barber-Greene Finisher is not new. Scores of major improvements have been embodied in its design since it was first released to the field 20 years ago. Each engineering advance is backed by experiences in laying every type of mix in virtually all conditions.

Latest improvements include:

New transmission — increases both operation and travel speeds, still provides 12 forward speeds for a wider range of operation.

Higher speed tamper — permits faster laying speeds and reduces maintenance costs.

New crawlers — precision-drilled pads and larger pins further decrease maintenance costs.

New power unit — 20% more power for pushing bigger trucks up steeper grades, with a greater reserve for high altitude and higher operating speeds.

Note to Barber-Greene Finisher Owners: *You can have any and all of these improvements on your machine. Necessary parts are available in kit form for each separate modification. Write for the folder describing the various kits.*

57-5-F

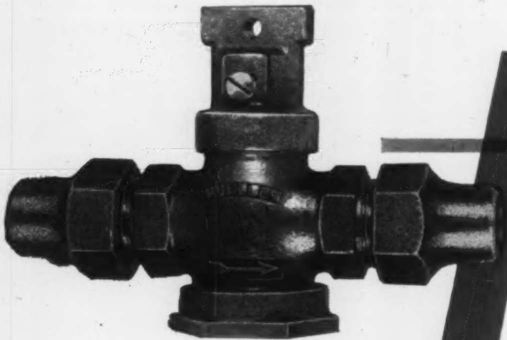
Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

MUELLER®

inverted key curb stops



DESIGN

Steeper key taper provides easier operation. Water pressure exerts an upward force for additional seating action. A downward tap unseats and pressure reseats the key.

superior

MATERIALS

All parts – body, key, coupling nuts, base caps, combined cap and tee, etc. – are cast from high-quality bronze. Leak-proof gasket around base cap prevents leakage.

WORKMANSHIP

All machining is to exacting tolerances. Bodies and keys are precision-fitted and individually lapped. Every stop is tested with air pressure under water.

■ A variety of Mueller Curb Stops is available, with a complete range of inlet and outlet types and combinations. Your Mueller Representative can help you with any Curb Stop problem. Call on him or write direct.

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles;
In Canada: Mueller, Limited, Sarnia, Ontario

DESIGN PRACTICES AND USES OF PREMOULDED JOINTS IN CONCRETE PAVEMENTS
A.I.A. FILE NO. 10
EXPANSION JOINT INSTITUTE
A.I.A. FILE NO. 10

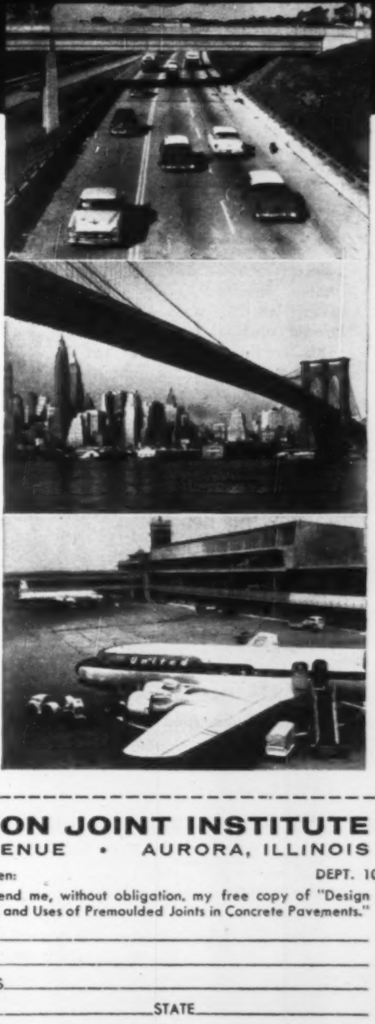
NEW "DESIGN PRACTICES" *Manual*

AVAILABLE AT NO CHARGE!

...provides an excellent addition to your pavement design file

The Expansion Joint Institute, composed of the major manufacturers of premoulded joint materials who have united to provide research, product development and technical data for the construction industry, has released a new manual, "Design Practices And Uses Of Premoulded Joints In Concrete Pavements." This manual, is the first of its type ever produced and was prepared in answer to many requests for a technical manual concerning the uses of expansion joints.

You'll find the comprehensive technical data and illustrations on the many types of premoulded joints, their applications and installation information included in this manual a very valuable addition to your design file. Send the coupon below for your copy, today!



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Gentlemen: DEPT. 10

Please send me, without obligation, my free copy of "Design Practices and Uses of Premoulded Joints in Concrete Pavements."

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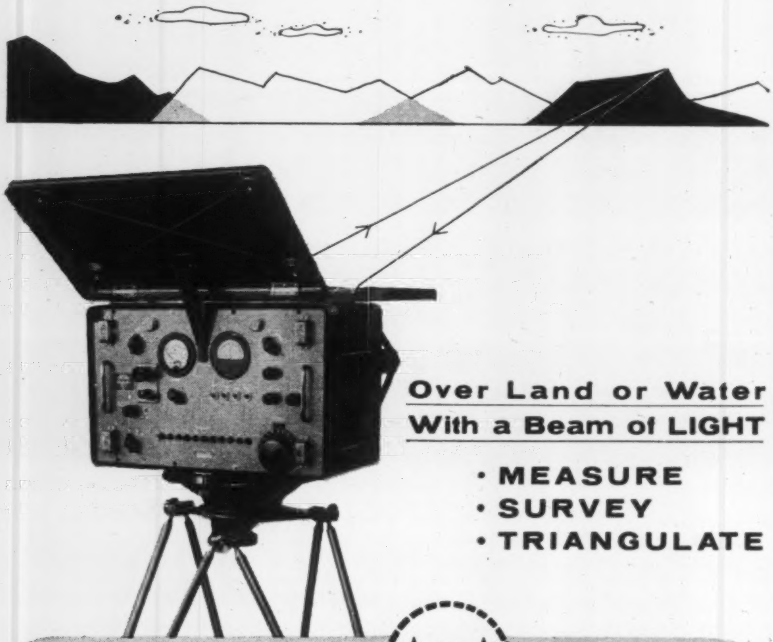
CITY________________STATE________________



AGA

REVOLUTIONARY

GEODIMETER

Introducing a new device for direct measurement of distance. This instrument is the result of 15 years of electronic and optical research. This is the instrument that proved the speed of light at the present accepted value 299,793.0 km/sec. The name Geodimeter is developed from GEOdetic Distance-Meter.

HOW THE GEODIMETER CAN BE USED

- City Surveying
- Base lines—triangulation arcs
- Traverse
- Photogrammetry
- Offshore Hydrography
- Radar Calibration
- Highway and Pipeline Surveys
- Oil Surveys
- Mine Surveys

Complete equipment includes Geodimeter, tripod, reflex system, and generator.

OVERALL GEODIMETER SIZE

21 x 14 x 12 inches
Weight:
58 lbs. for Geodimeter
22 lbs. for tripod
10 lbs. for reflector
22 lbs. for generator

ACCURACY:

The model 3 Geodimeter and 2 men can measure more than 8 traverse lines in 8 hours. (Range 1 to 20 miles.) Error less than ±4 inches or 10 cm ± two millionth of the distance.

SENSITIVITY:

The Geodimeter is so sensitive that highway staking can be accelerated by using expendable "Skotch-Lite" tape on stakes.

ECONOMY:

Only one man operates a Geodimeter, a second moves reflectors similarly to a rodman.

RUGGED AND CONVENIENT:

The Geodimeter is a sensitive instrument yet it is made to be portable and is extremely rugged.

DOLLARS AND CENTS:

4 or 5 surveyors cost you $20,000 to $35,000 per year. You can reduce this cost by one half while you double your work output.

For full information please write for free illustrated booklet.

THE GEODIMETER CO. A Division of

BERG, HEDSTROM & CO., INC., 1170 BROADWAY, NEW YORK, N. Y.

Applied Force In Error

Sir—In your article concerning prestressed bridge beams (ENR Jan. 9, 1958, p. 46) you stated in the caption that a 1,600 kip pull is applied to each 16 wire cable. Since the wires are ¼ in. dia, such a pull would stress them to more than 2,000 kips per sq in. This surely is incorrect. Maybe the 1,600 kip pull is the total applied force.

Would you kindly clear up this matter?

W. C. Graeub
G. H. Ruhe
Department of Highways
District of Columbia

(Editor's Note: The 1,600 kip pull is the total force applied to twelve cables, not each of twelve 16 wire cables.)

First Gold-Hued Panels

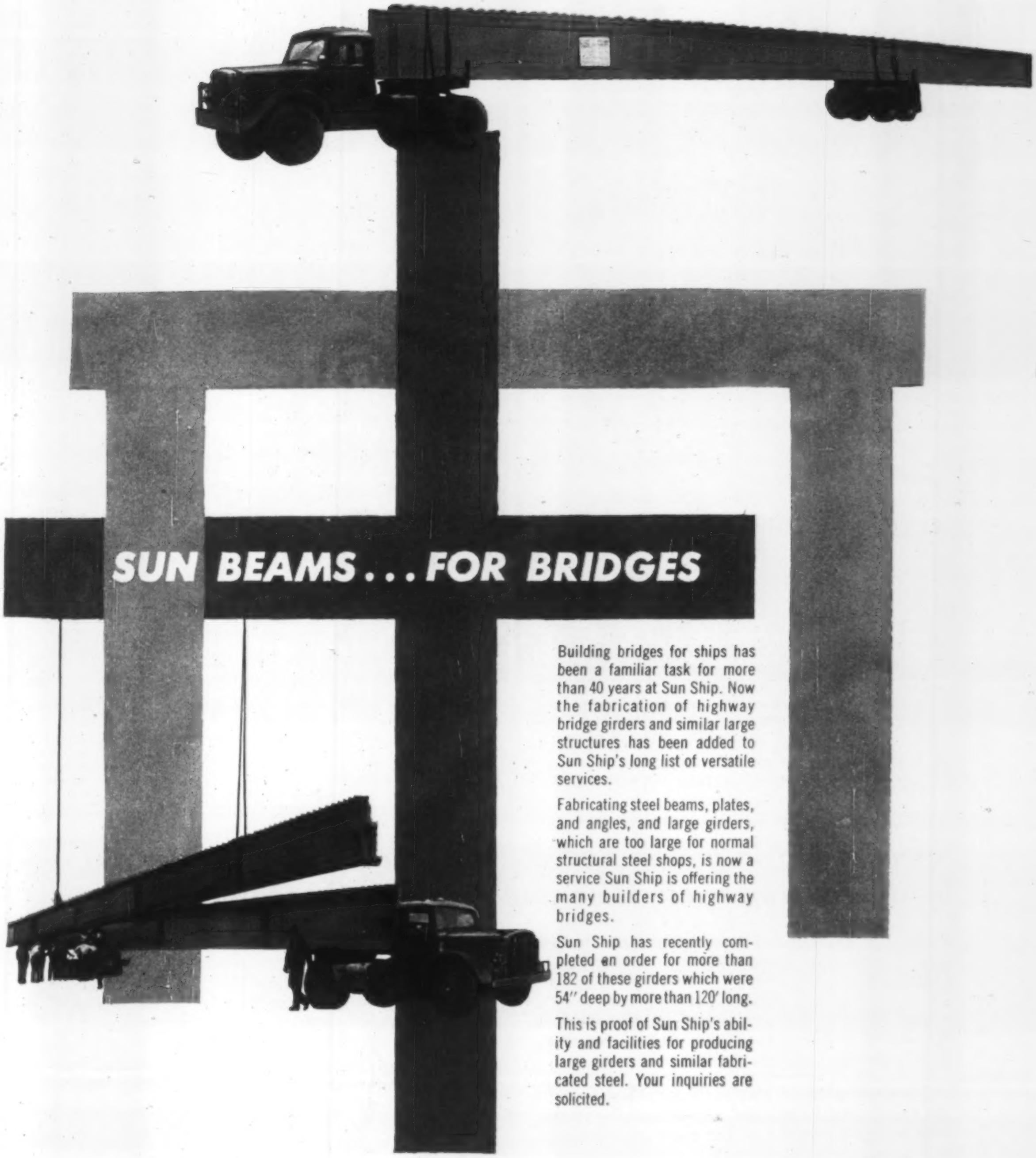
Sir—Contemporary architectural history as reported in ENR is confusing. In your Nov. 7, 1957, issue, p. 28, you stated that the first gold-anodized aluminum panels for buildings were then being installed on a 34 story New York City office building. A letter in your Dec. 19 issue, p. 10, attributed the first application of gold aluminum panels to a five-story bank building at Long Island City completed last year.

However, this office designed a building faced with gold aluminum panels back in 1953. The structure, the Alcoa district sales office in Cincinnati, Ohio, was completed in 1954 (ENR, July 1, 1954, p. 23.)

Russell O. Deeter
Schell and Deeter, Architects
Pittsburgh, Pa

CALENDAR

Associated General Contractors, 39th annual meeting, Dallas, Tex., Feb. 10-13.
National Society of Professional Engineers, spring meeting, Michigan State University, East Lansing, Mich., Feb. 13-15, 1958.
Association of Asphalt Paving Technologists, Sheraton-Mt. Royal Hotel, Montreal, Canada, Feb. 17-19.
National Council for Stream Improvement (of the pulp, paper and paperboard industries), annual meeting, the Waldorf-Astoria, New York, N. Y., Feb. 17-20.
American Concrete Institute, annual convention, Morrison Hotel, Chicago, Ill., Feb. 24-27.
American Society of Civil Engineers, Chicago convention, Hotel Sherman, Chicago, Ill., Feb. 24-28.
Building Research Institute, Plastics Study Group meeting, University of Houston, Houston, Tex., Mar. 5-6.
American Concrete Pipe Association, 50th annual convention, Roosevelt Hotel, New Orleans, La., Mar. 9-13.
American Railway Engineering Association, annual meeting, Sherman Hotel, Chicago, Ill., Mar. 11-13.
New Jersey Sewage and Industrial Wastes Association, 43rd annual meeting, Traymore Hotel, Atlantic City, N. J., Mar. 12-14.



SUN BEAMS . . . FOR BRIDGES

Building bridges for ships has been a familiar task for more than 40 years at Sun Ship. Now the fabrication of highway bridge girders and similar large structures has been added to Sun Ship's long list of versatile services.

Fabricating steel beams, plates, and angles, and large girders, which are too large for normal structural steel shops, is now a service Sun Ship is offering the many builders of highway bridges.

Sun Ship has recently completed an order for more than 182 of these girders which were 54″ deep by more than 120′ long.

This is proof of Sun Ship's ability and facilities for producing large girders and similar fabricated steel. Your inquiries are solicited.

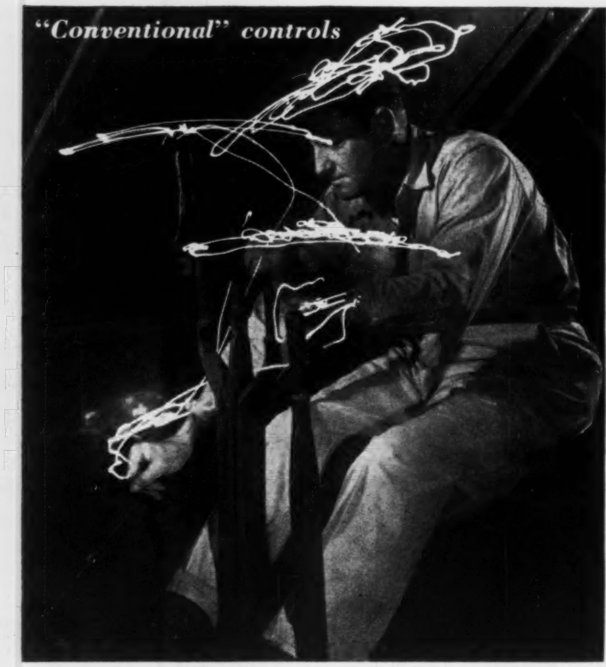
Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE SINCE 1916 CHESTER, PA.

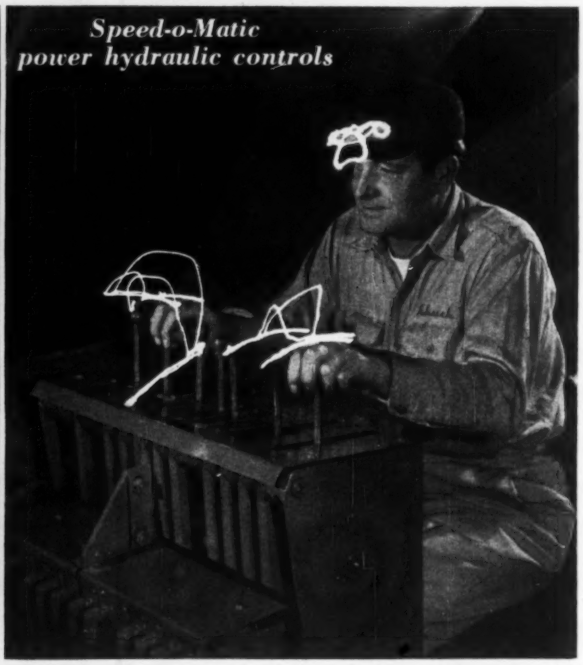
Time-light camera shows!

Which shovel-crane produces more?



"Conventional" controls

Follow the light lines. They show the "long reach" moves an operator makes with conventional controls to complete a hoe cycle, then shift from swing to travel, steer right and left and shift back from travel to swing. Such "arm's-length" work with slow mechanical or booster systems adds seconds to every move, drains operator strength, cuts end-of-the-shift output.



Speed-o-Matic power hydraulic controls

No reaching, no yanking . . . just easy, "keyboard" operation with Speed-o-Matic controls and Independent-Swing-and-Travel when performing the same operations as the hoe with conventional controls. Short-throw levers speed cycles, up output, conserve operator strength. Ask the man who has worked both controls. He'll pick Speed-o-Matic every time!

Speed-o-Matic power hydraulic controls increase output by decreasing cycle time and reducing operator fatigue

Pushing a shovel-crane at its highest limit all shift long is easy with Speed-o-Matic power-hydraulic controls.

And Speed-o-Matic—standard on all Link-Belt Speeder shovel-cranes—is the original fingertip, flick-of-the-wrist system.

Hydraulic pressure assures the same fast, smooth response *all day,* without adjustments . . . and with perfect feel of the load at every lever position.

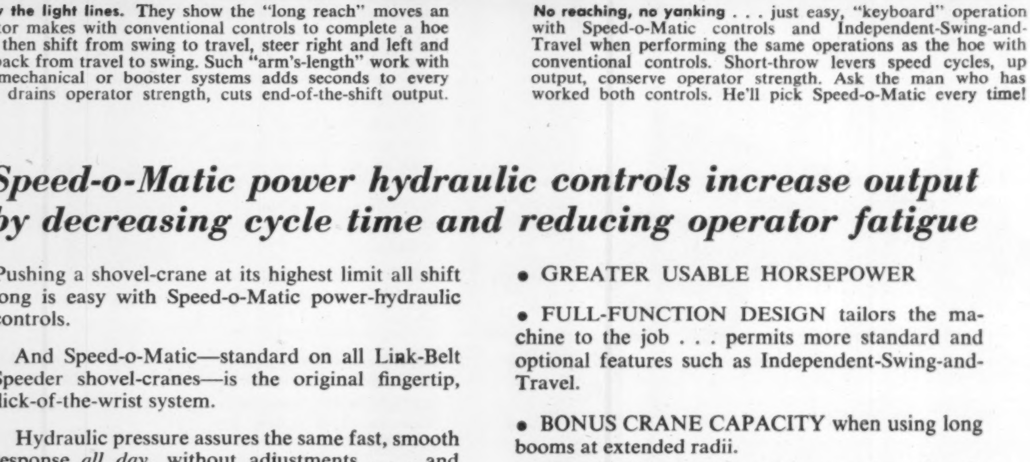
And Speed-o-Matic power-hydraulic controls are only one of the many Link-Belt Speeder advantages. Others include—

- GREATER USABLE HORSEPOWER
- FULL-FUNCTION DESIGN tailors the machine to the job . . . permits more standard and optional features such as Independent-Swing-and-Travel.
- BONUS CRANE CAPACITY when using long booms at extended radii.

For complete details on why your best shovel-crane investment is a Link-Belt Speeder, contact your distributor or write LINK-BELT SPEEDER CORP., Dept. ENR-258, Cedar Rapids, Iowa, for book 2553.

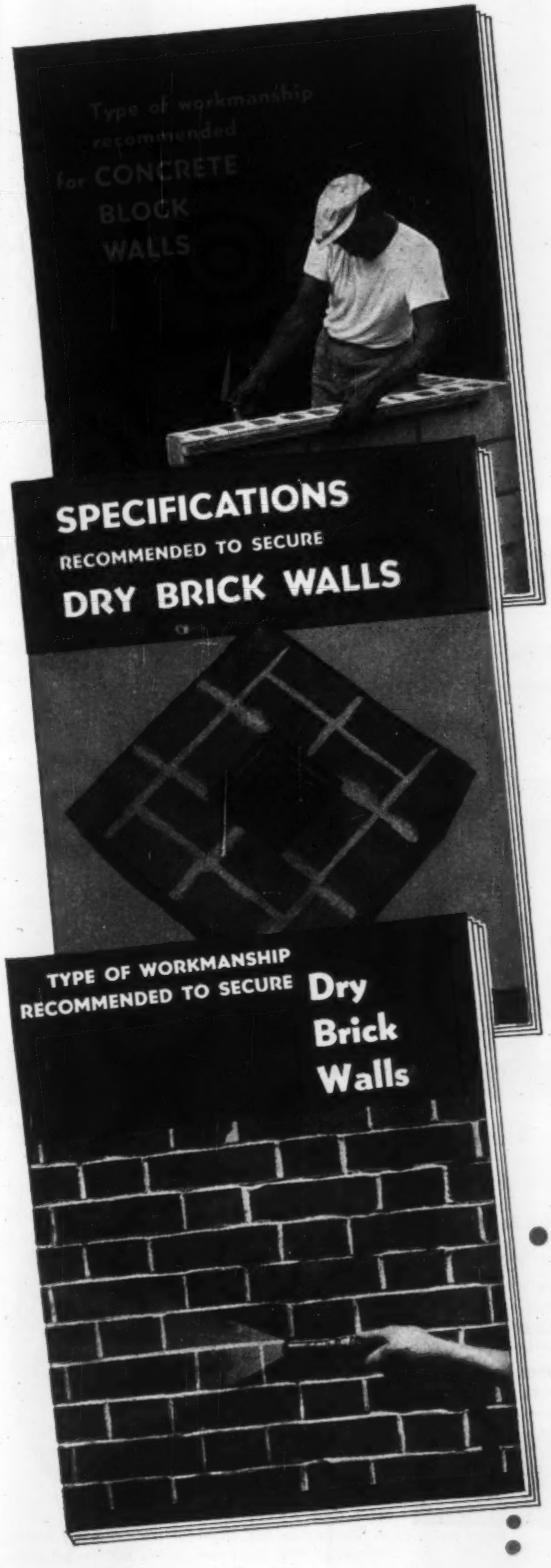
14,796

LINK-BELT SPEEDER



18 crawler models — 6 truck-cranes — 4 self-propelled models

It's time to compare . . . with a Link-Belt Speeder


Type of workmanship recommended for CONCRETE BLOCK WALLS
SPECIFICATIONS RECOMMENDED TO SECURE DRY BRICK WALLS
TYPE OF WORKMANSHIP RECOMMENDED TO SECURE Dry Brick Walls

GET THESE IMPORTANT BOOKS!

THE three books at the left are a "must" for anyone who is interested in good masonry construction. One describes the type of *workmanship* recommended to secure dry brick walls. The second describes the *specifications* recommended to secure dry brick walls. The third describes the type of workmanship recommended for *good concrete-block walls.*

Each of these books has been endorsed by foremost authorities. Each has received a citation of merit from the Producers' Council and the American Institute of Architects. Each is fully illustrated, clearly written. Each contains a wealth of really valuable information.

These books are *not* advertisements for our product, Brixment. They are published and made available to members of the building trades solely as an industry service. Mail the coupon, *today*, for your free copies.

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Gentlemen:

Without cost or obligation, please send me a copy of each of your three books on masonry construction.

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BIG PROJECTS PROVE IT!

Firestones are carrying more loads per dollar!

From the St. Lawrence Seaway to the Priest Rapids Dam in the State of Washington, records prove that Firestone Rock Grip Tires with S/F—safety-fortified—Nylon outwork and outwear them all. Tough cord bodies withstand severest punishment to slash downtime losses. You cut tire costs because two great tread designs match these off-the-highway tires to *any* job. You get the *flotation and traction* you need in loose earth and wet going. You get *armored* protection for hauls over splintered shale and knife-edged rocks. Firestone Tires defy cuts and slugging impacts like no other tires made. Ask your Firestone Sales Engineer about these *tubed* or *tubeless* heavy-duty tires. Call him today at your local Firestone Dealer or Store.

ROCK GRIP WIDE BASE ROCK GRIP

Firestone

BETTER RUBBER FROM START TO FINISH

Enjoy the Voice of Firestone on ABC television every Monday evening.

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Which Twin is the PHONY?

One of these clutch sleeves
will cause trouble . . .
within 10,000 miles!

If you picked the sleeve on the left, you're right! That shiny, "brand-new" look is the tip-off. It means the face has been reground, removing all or most of the case-hardening necessary for long, trouble-free wear.

The sleeve face of the genuine Lipe Guaranteed Clutch at right bears the almost-black finish of newly case-hardened and Luberized steel. Case-hardening to a depth of .007" and a further surface treatment which impregnates the pores of the metal with a lubricating preservative increases the life of Lipe clutch sleeves *5 to 10 times* over that of untreated or reground sleeves.

Field rebuilders' "short cuts" mean short clutch life for you!

A reground sleeve is just one fault you may find in a field-rebuilt clutch. In addition, there may be improper balancing; faded pressure springs that cannot maintain the required torque; reground pressure plates that warp and dish under normal friction heat.

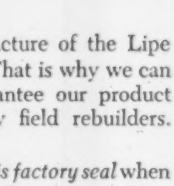
All parts in Lipe Clutches conform to high precision standards!

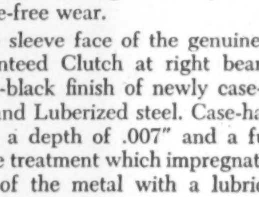
From our experience in supplying clutches to 54 makers of heavy-duty equipment comes the know-how that goes into the manufacture of the Lipe Guaranteed Clutch. That is why we can unconditionally guarantee our product to be unequalled by field rebuilders.

Look for this factory seal when you take delivery on a Lipe Guaranteed Clutch for replacement service. It is your assurance of long trouble-free life, and big long-run savings.

SEND FOR OUR FREE "Clutch Facts" Booklet

Tells you how to get more life from your heavy-duty clutches and what to look for when replacing them.





Lipe-ROLLWAY
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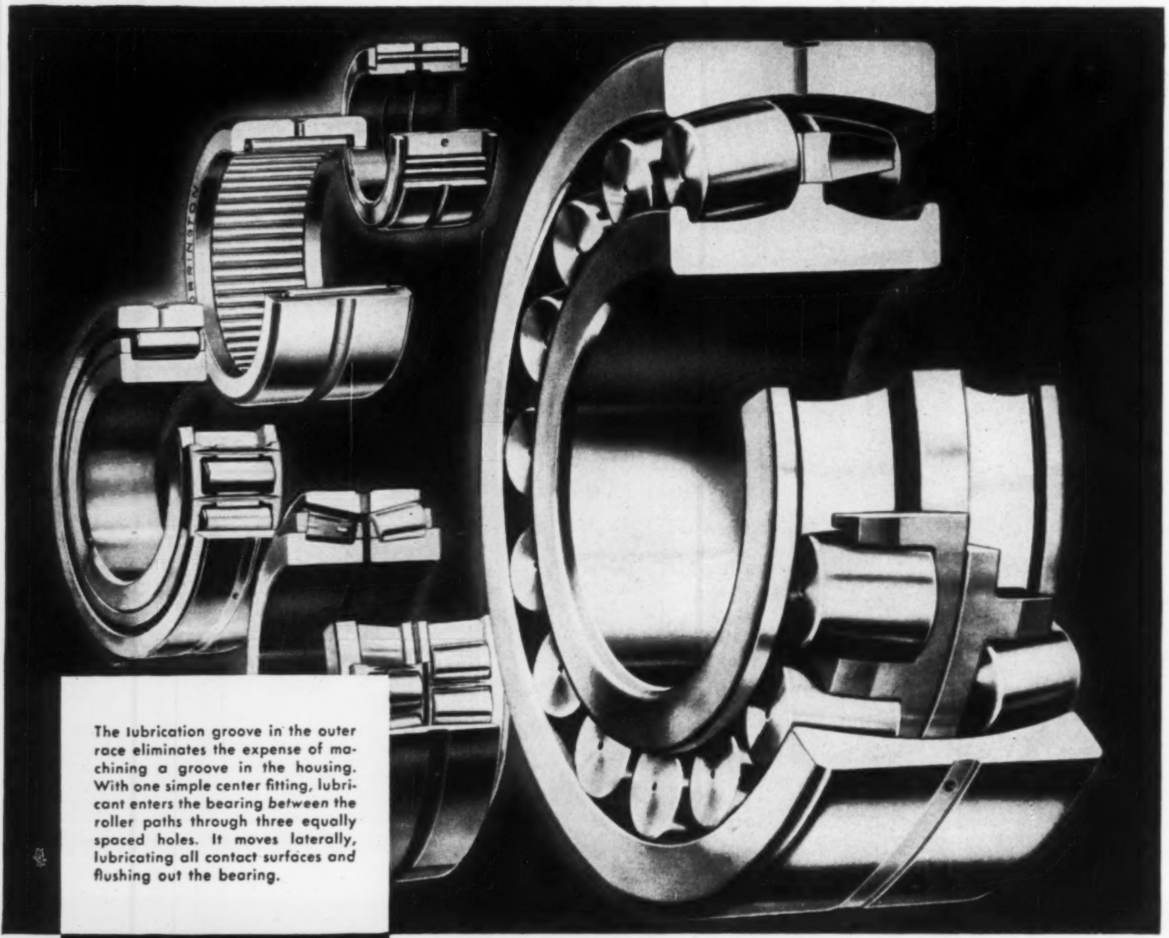
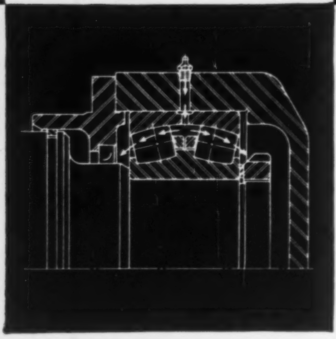


The lubrication groove in the outer race eliminates the expense of machining a groove in the housing. With one simple center fitting, lubricant enters the bearing *between* the roller paths through three equally spaced holes. It moves laterally, lubricating all contact surfaces and flushing out the bearing.



A time-proved lubricating method now available on Torrington Spherical Roller Bearings

The circumferential groove in the outer race has met the test of experience in many Torrington Bearings, including Heavy Duty Needle Bearings, Aircraft Type Needle Bearings, Tapered and Radial Roller Bearings. Now the circumferential lubrication groove is available in Torrington Spherical Roller Bearings.

This design feature makes it possible to introduce lubricant *between* the roller paths without the expense of machining a groove in the housing. This groove is proportioned to provide generous lubricant flow capacity. Lubricant moves through the roller paths, flushing used lubricant and contaminants away from bearing contact surfaces.

Torrington Spherical Roller Bearings in many sizes may be ordered with this groove as desired at no additional cost. For further information, see your Torrington representative or write: **The Torrington Company, South Bend 21, Ind.—and Torrington, Conn.**

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada

SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE • BALL • NEEDLE ROLLERS • THRUST

if it can't pass these tests don't put it underground!

- **Is it rust and rot-proof?**
- **Is it acid and detergent-proof?**
- **Does it provide permanent protection against ALL corrosive wastes?**
- **Is its interior smooth enough and its diameter large enough to permit free flow of wastes . . . eliminate clogging?**
- **Will it handle harsh drain-cleaning compounds?**
- **Will it withstand the extra stresses of heavy backfill loads?**
- **Can it withstand the acids and gases generated by ground garbage?**
- **Can it stand extreme temperature changes without cracking?**
- **Is it backed by a long-term written guarantee?**

Substitute materials can pass some of these tests . . . but only *Clay Pipe* can pass them *all*.

And now new, longer, stronger Clay Pipe speeds up installation . . . cuts material and labor costs.

Specify and install Clay Pipe—the only pipe with *all* the features you can trust. *It never wears out.*

C-458-4

Vitrified **CLAY PIPE** *Never Wears Out*

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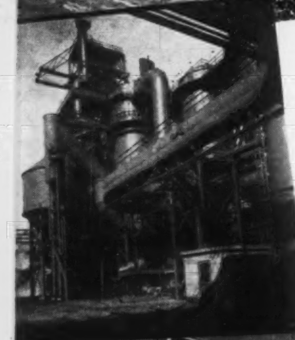
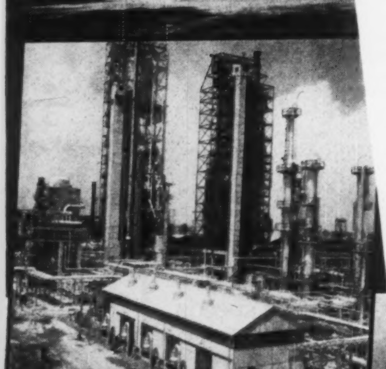
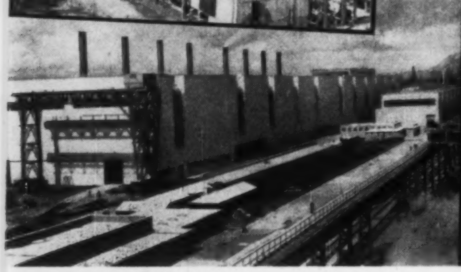
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio • 703 Ninth & Hill Bldg., Los Angeles 15, Calif. • 100 N. La Salle St., Rm. 2100, Chicago 2, Ill. • 206 Mark Bldg., Atlanta 3, Ga.







Have you investigated this foundation method?

These structures, like a great many others in the United States, have one important feature in common – *all are built on Franki foundations.* The main reason that Franki was chosen for this work was because of the unique Franki Displacement Caisson–an end-bearing foundation unit with an expanded base forged by ramming the concrete with 140,000 ft. lb. blows. These are some of the resulting advantages:

- In granular soils, the standard Franki Displacement Caisson will carry loads of 120 tons or more.
- Saving in costs of reinforced concrete caps because fewer caissons are required.
- Franki Displacement Caissons are immune to the effects of a fluctuating water table because they are strictly end-bearing.
- A considerable saving in length compared with friction piles is possible due to the expanded base.
- Numerous successful load tests – compression and uplift – have been conducted to confirm the bearing capacity of the caissons.

Franki work is guaranteed.

Franki quotations are usually lump sum without qualification and payment for excess footage.

Franki Foundation Company, as foundation specialists, also install pressure injected footings, tube piles and underpinning and conduct soil investigations.

Consult Franki on your foundation problems

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FRANKI
foundation specialists

Write or phone for literature on various Franki foundation methods.

CATERPILLAR

...AND YOUR STAKE IN A $60 BILLION* JOB

D8 at work for Cameron, Joyce & Co.
on the first section of the
Interstate-Defense Highway System,
south of St. Charles, Missouri

The National System of Interstate and Defense Highways is the greatest construction job man has ever undertaken—a network of wide, safe freeways linking 48 states, and serving 90 per cent of all cities in the United States with 50,000 or more population. Its 41,000 miles of roads are part of this country's tremendous $60 billion* highway program.

All of us in the earthmoving field are partners in building this Interstate Highway System, and the equally important primary, secondary and urban systems. We—and this is without parallel in any other field—can point to this vast project and say, "This is our future."

Vital to the fulfillment of this great road program is solid public support.

Every citizen must be kept interested, informed and alert. He must be reminded of the tremendous benefits in national defense, in local business improvement, in personal safety, convenience and economy which the new highways will provide.

For nine years it was Caterpillar national advertising that helped mold opinion in favor of the new public roads. Today, Caterpillar national advertising is taking on the burden of *keeping* public opinion informed and favorable.

PROGRESS ON THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS AT A GLANCE

Work being done now: $1,123,059,000† **Work completed: $270,004,000†**

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*Based on current estimates.

†Based on figures as of December 31, 1957.

OGDEN
SALT LAKE CITY
CHEYENNE
NORTH PLATTE
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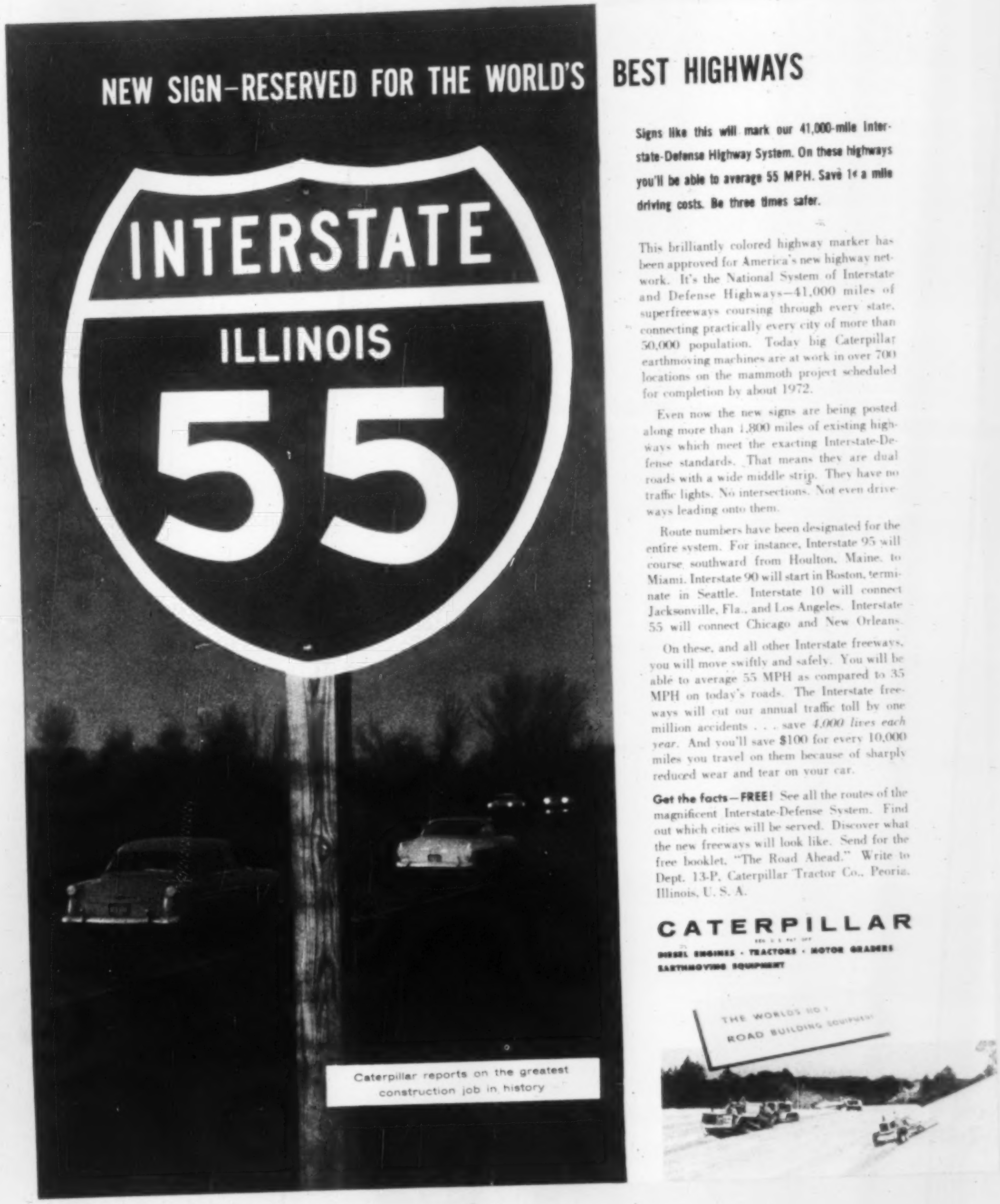
LINCOLN


INTERSTATE
ILLINOIS
55
THE WORLD'S NO. 1
ROAD BUILDING EQUIPMENT

NEW SIGN—RESERVED FOR THE WORLD'S BEST HIGHWAYS

Signs like this will mark our 41,000-mile Interstate-Defense Highway System. On these highways you'll be able to average 55 MPH. Save 1¢ a mile driving costs. Be three times safer.

This brilliantly colored highway marker has been approved for America's new highway network. It's the National System of Interstate and Defense Highways—41,000 miles of superfreeways coursing through every state, connecting practically every city of more than 50,000 population. Today big Caterpillar earthmoving machines are at work in over 700 locations on the mammoth project scheduled for completion by about 1972.

Even now the new signs are being posted along more than 1,800 miles of existing highways which meet the exacting Interstate-Defense standards. That means they are dual roads with a wide middle strip. They have no traffic lights. No intersections. Not even driveways leading onto them.

Route numbers have been designated for the entire system. For instance, Interstate 95 will course southward from Houlton, Maine, to Miami. Interstate 90 will start in Boston, terminate in Seattle. Interstate 10 will connect Jacksonville, Fla., and Los Angeles. Interstate 55 will connect Chicago and New Orleans.

On these, and all other Interstate freeways, you will move swiftly and safely. You will be able to average 55 MPH as compared to 35 MPH on today's roads. The Interstate freeways will cut our annual traffic toll by one million accidents . . . save *4,000 lives each year.* And you'll save $100 for every 10,000 miles you travel on them because of sharply reduced wear and tear on your car.

Get the facts—FREE! See all the routes of the magnificent Interstate-Defense System. Find out which cities will be served. Discover what the new freeways will look like. Send for the free booklet, "The Road Ahead." Write to Dept. 13-P, Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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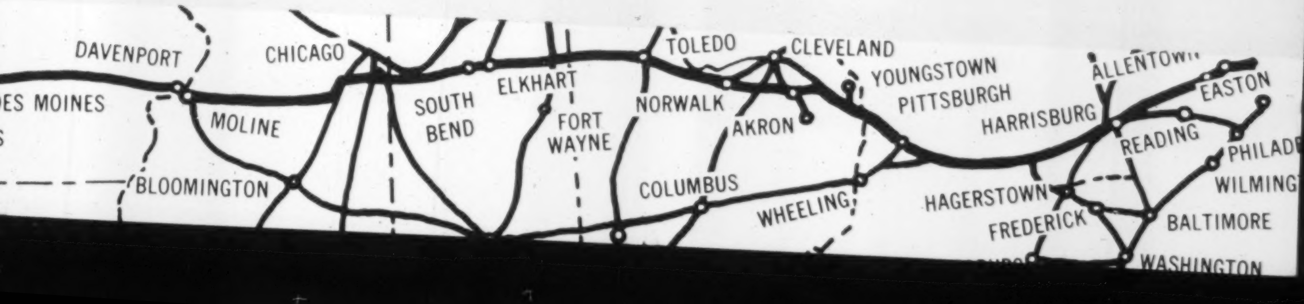
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Cat equipment is on the job all over the country, helping to build our new expressways efficiently and economically. Caterpillar's intensive program of research and development has given you the most complete line of high-production, cost-cutting earthmoving machines in the world today.

There are new and improved models all the way down the line: Tractors, Traxcavators, Motor Graders, Scrapers and Wagons, Engines and Electric Sets. They're ready *now* to give you greater production, lower operating costs and surer profits.

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Dept. ENR2, Caterpillar Tractor Co., Peoria, Illinois

Please send me, immediately, complete up-to-date information on the Federal highway program.

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ONE GOAL: To concentrate our capabilities, resources and experience on the design, manufacture, distribution and service of job-tested heavy equipment.

ENGINEERING NEWS-RECORD
Vol. 160, No. 7 February 13, 1958
Number of copies printed this issue 82,283

CONTENTS

ENR's 83rd Annual Report

REVIEW AND FORECAST...... 47

Business and Finance

Easier Money Favors Construction in 1958...... 93

Labor

Wages Are Moving to Higher Levels.......... 98

Buildings and Housing

Techniques and Trends..................... 103
Major Projects 117

Transportation

Techniques and Trends..................... 155
Major Projects 168

Water Resources

Techniques and Trends..................... 205
Major River Use and Control Projects......... 217
Major Water Supply and Sanitation Projects... 236

National Affairs

Crafts and NCA Join in Cutting Costs.......... 41
Downtown Baltimore Declared Renewal Area... 42
Novel Shapes Prescribed for Hospital......... 43
Eleven-Story Building Overturns.............. 44
Uses of Plastics Spread..................... 44
Vermont Road Embargo Lifted................. 45
McGraw Submits Bid for Hartford Renewal...... 45
Raymond Concrete Plans to Change Name...... 45
News Briefs 45

Reader Comment 9
Calendar 28
Washington Observer. 39
Unit Prices 248
Materials Prices 252
Construction Reports. 258

About this issue

This year's Review and Forecast Issue is different from those of other years in a few important respects: As one change, the subject of Water Resources is treated as a single element, rather than being divided into water supply and sanitation, and river use and control for discussion of significant techniques and trends. As another, several regular news departments (International, New Products, Men and Jobs, Business and Finance, and Labor) are dropped this week to give space and emphasis to annual report and forecast articles. And finally, trends in Business and Finance, and Labor are included among these articles this year for the first time.

Back issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Semi-annual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in Industrial Arts Index and Engineering Index.*

THE CONSTRUCTION WEEK

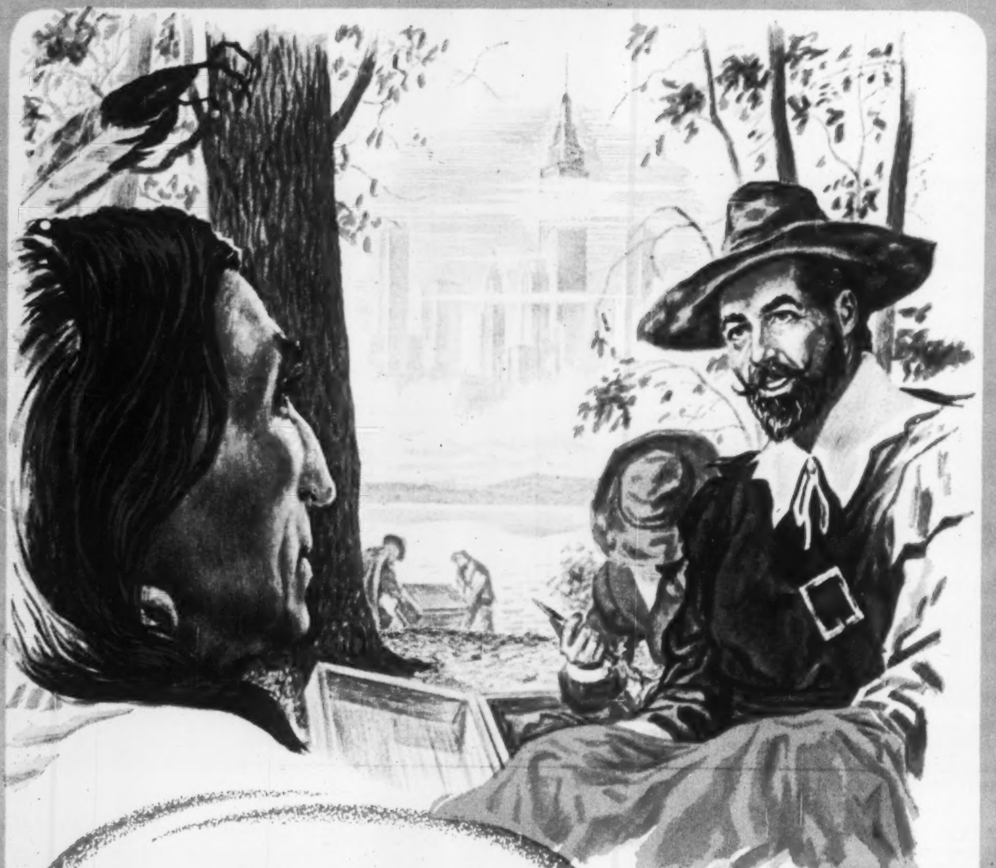
NIAGARA TO MOVE FAST—This week the first construction contractor on the Niagara power project, Merritt-Chapman & Scott Corp., started moving equipment to the site, while the New York State Power Authority made ready for a quick succession of bid calls and awards for other major parts of the job. Expected to be let during April, May and June are contracts covering sections of covered conduit and open canal waterway, the intake structure above the falls and the pump storage plant. Only bottleneck could be the pump storage reservoir, where land negotiations with the Tuscorora Indians have yet to be completed.

COMPUTERS HIKE FLOOR LOADS—Bowing to the steady upward trend in the weight of machinery in the modern office, Roscoe Ajax Co., a Washington, D. C., speculative builder, is starting work this week on an office building with an extra floor load capacity of 30 psf just for machinery. The D. C. code sets a 70 psf minimum for office buildings, but Edwin Weihe & Associates, Washington architects, and Jacob Feld, New York engineer, have designed the floors of the 11 story reinforced concrete structure to support 100 psf.

WHERE ARE JERSEY CITY'S 36 MGD?—Jersey City, N. J. was hard pressed this Monday to explain the loss of an estimated 1½ million gallons of water per hour from its distribution system. The evidence of loss was purely circumstantial. Dropping water pressure—to a tenth of normal—in the downtown area set off a frantic search for the main break. With this large volume of water disappearing every hour and no hint of where a cave-in or calamity might eventually occur, industries and schools closed while some 1,000 workers raced to find and repair the break.

INSIDE STORY OF A COMPROMISE—How do structures get named? Here's the behind-the-scenes story on two of them on the St. Lawrence Seaway. New York Republicans proposed naming the Grasse River lock for the late Rep. Bertrand H. Snell who sponsored the first Seaway Bill back in 1917. This was cleared with everyone but Sen. Alexander Wiley of Wisconsin sponsor of the Seaway Bill that finally passed Congress. The senator wanted the lock named for himself and his House co-sponsor, Rep. George Dondero of Michigan. Harrassed Seaway officials broke the impasse finally, by suggesting that the Grasse River lock become Snell Lock and the 10 mile Long Sault canal become the Wiley-Dondero Canal. The third unit, Robinson Bay lock, was re-named the Eisenhower Lock two years ago.

LOCK JOINT ECONOMIES: *One of a Series*



It's a bargain!

If Peter Minuit were alive today probably nobody would be more surprised than he at the extent of the bargain he made with the Indians for Manhattan. His $24 investment now has an assessed valuation of more than $7,000,000,000.

But no one should be surprised at the value offered by LOCK JOINT CONCRETE PRESSURE PIPE. For a great many years the low first cost of this pipe has been assured by keen competitive bidding, its simplicity and speed of installation have helped to reduce construction costs, its record for dependable, trouble-free service has been unexcelled and its operational and maintenance costs have been minimal.

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WASHINGTON OBSERVER

- **AFL-CIO, operating engineers and McClellan**
- **Construction items in stockpile list**
- **Depreciation allowance idea up again**
- **Atomic power construction fight resumes**

● **The AFL-CIO hopes it can keep the operating engineers from going back before the McClellan rackets investigating committee.** AFL-CIO boss George Meany and the new chiefs of the operating engineers plan to do their own clean-up job (see page 41). Senator McClellan had planned to dig further into the affairs of union president William Mahoney, who has now resigned. Union officials hope they can prove they can do the job themselves and thus keep the Congressional committee from further digging.

—

● **A shopping list for a civil defense stockpile** is being established by the Office of Defense Mobilization. The list will include a variety of items such as medicine, diaper cloth to five-ton trucks, housing materials and even prefabricated emergency shelters.

The stockpile for post-nuclear attack was recently recommended by a special citizens committee on strategic stockpile policies. The committee suggested that the government switch from warehousing strategic commodities—most stocks are fairly complete—to items that would be used to sustain and protect the people in case of a nuclear attack.

Some of the items suggested for stockpile: Rigging tools, ferric chloride, ferrous sulphate, chlorinated copperas, chlorinators, soda ash, sewer pipe and fittings, hand tools, gypsum board and asbestos cement sheets and wallboard, plywood, doors and windows, asphalt and tar roofing and siding products, pumps.

—

● **Proposals to loosen up the depreciation allowances on industrial plant have been given another push.** The tax-writing Ways and Means Committee heard steel industry experts again suggest that companies should be permitted to deduct enough amortization allowances to enable them to pay for replacement costs of the plant and equipment, instead of its original cost.

The same proposal was put forward most forcibly back in 1954 when Congress put through its big tax revision bill. The idea was solidly defeated then, and even proponents of the idea privately admit they see no chance of its getting anywhere now.

—

● **The Administration's atom power program is in heavy water.** The Democratically controlled Atomic Energy Committee next week will begin an inquiry into the Atomic Energy Commission's program—and it already is obvious the hearings will be critical.

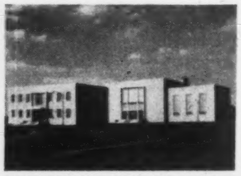
Democrats charge chairman Lewis L. Strauss is "complacent" about progress in construction of civilian power installations. The old proposal of Sen. Albert Gore of Tennessee for a $400 million federally financed construction program will be revived; something short of that probably will be pushed by the Democrats. Some atom equipment and construction companies are now, reluctantly, coming in behind a larger federal contribution to the program.

8 more jobs prove Foster Pipe Piles

Walnut St. Bridge, Wilmington, Del.
A. S. Wilkstrom Inc., Skaneateles, N.Y.

Florida Power and Light Co. Plant
Murphy Construction, Palm Beach

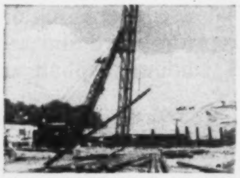
New York Thruway Connecting Link
Carlo Bianchi & Co. Inc., Framingham


Jersey City Sewage Treatment Plant
Garden State Constructors & Assoc.

Brazos River Bridge, Hearne, Tex.
J. A. Raines Construction Co., Okla.

Mississippi River Bridge, Lansing, Ia.
Brennan Brothers, LaCrosse, Wis.

Connecticut Turnpike Feeder
C.W. Blakeslee & Sons Inc., New Haven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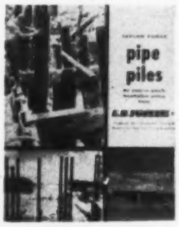

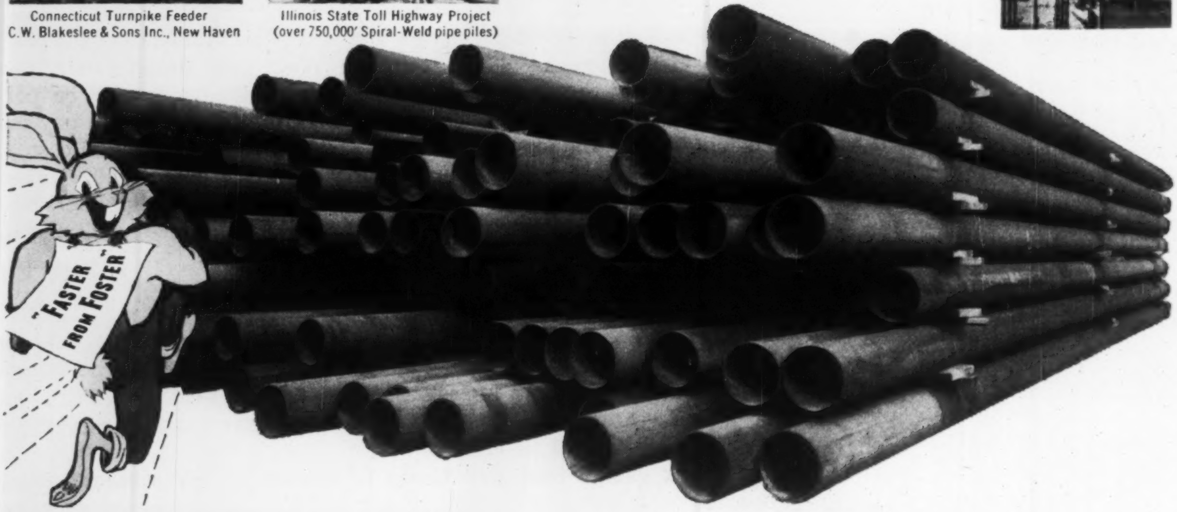

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Crafts and NCA Join in Cutting Cost

A major breakthrough in reducing construction labor costs seemed nearer last week when building trades unions in the AFL-CIO Building and Construction Trades Department reached agreements to try to eliminate jurisdictional disputes and wasteful work practices.

In two quick moves, the 18 craft unions of the labor federation settled two issues that have plagued them for years.

Led by Building Trades President Richard J. Gray, the unions:

- Drew up a working agreement with Walter Reuther's Industrial Union Department that could lead to a settlement of jurisdictional fights over the right to construction work in the nation's industrial plants.
- Came to terms with the National Constructors Association on 10 "principles of agreement" defining various work practices that both sides want to see adopted or eliminated in all construction.

Both settlements are aimed at eliminating heavy indirect union costs of construction outside the wage area. They are considered, even from the union viewpoint, as "excessive" expenses that have grown up slowly and informally as part of construction union practices.

The agreements were reached during the course of the AFL-CIO's Executive Council meetings at Miami Beach, Fla., where labor officials have been meeting to draw up their 1958 union programs.

In part, the settlements were a reflection of an AFL-CIO craft union sentiment that high costs were doing them out of business—a feeling that showed up first when Building Trades President Gray recently suggested a moratorium on wage increases. (He has since dropped this proposal because of the AFL-CIO's official position that higher wages are essential to the nation's economic well-being.)

The significance of labor expenses in business costs was the big factor in after three years of trying, finally coming up with a program for eliminating wasteful work practices in construction. Too, the jurisdictional wars with the industrial unions have been costly to both union factions as well as to management. And, in some cases, relative labor costs may have prompted assignments of in-plant construction work to industrial rather than craft union workers.

• The prospect—These agreements do not mean that contractors are going to find extra costs suddenly eliminated. Both plans must be worked out in detail before they go into effect.

In the case of the Building Trades-IUD jurisdictional plan, the parties drew up an outline of their respective job construction rights and left the working areas in dispute to be settled by referees appointed by each side. It means, in effect, taking each dispute separately for settlement.

The plan between the craft unions and contractors is essentially a policy guide. The intent is to push endorsement of the principles into local union

"Ten Commandments" of NCA-Building Trades

John J. O'Donnell
NCA President

Richard J. Gray
Building Trades President

1. Foremen and general foremen should be selected by management.
2. Daily travel allowances and subsistence should be paid only in cases of hardship.
3. Welding torches are tools of the trade and should not be limited to any single craft.
4. Workers should be at their places of work at regular starting times and should remain until regular quitting times.
5. Jurisdictional disputes should be settled by established building trades procedures without job interruptions or delays.
6. Area practices that are not part of national collective bargaining agreements should not be recognized or enforced.
7. Slowdowns, the forcing of overtime, use of standby crews, spread-work policies and other feather-bedding practices shall not be permitted.
8. Union stewards must be qualified journeymen performing work, and use of non-working stewards is to be eliminated.
9. There shall be no work stoppages or lockouts during the processing of disputes or grievances in accordance with local or national agreements.
10. There shall be no limit on production of workmen nor restriction on the full use of proper tools or equipment and there shall not be any task work or piecework.

. . . Cost cutting plan took three years

contracts. This, of course, will take time.

But, the hope is to eliminate unnecessary costs in both areas eventually and to make union construction work more competitive on the market. Just the decisions to move ahead with both plans are a big step in that direction.

• **IUD-Building Trades**—The compromise reached between Mr. Reuther's IUD and Mr. Gray's Building Trades Department came as a surprise. Jurisdictional conferences had not been on the agenda of the AFL-CIO council sessions.

The feud between the craft and industrial unions which burst into the open warfare when the AFL-CIO was formed, has been the biggest threat to the AFL-CIO merger (ENR Nov. 28, 1957, p. 87).

From the ranks of the building trades at the local level have come spotty and sporadic cries for secession from the AFL-CIO in order to protect the traditional jurisdiction of the building trades unions.

A temporary truce was reached in Atlantic City in December, when the Building and Construction Trades Department gave the AFL-CIO until February 28 to come up with another proposed solution to the conflict before the building trades decided on a final course of action.

One factor helping to lead to the new agreement was the absence of the teamsters union which had been expelled from the AFL-CIO on racketeering charges. The teamsters, while in the federation, had fought such an agreement.

When they sat down together this time, one of a half-dozen such meetings, Mr. Gray and Mr. Reuther came out with a package that was not too different from an abortive agreement reached last summer. As in that one, this settlement provides that new plant construction would go to the craft unions; production and running maintenance work to the industrial unions.

In the old plan the area in dispute was spelled out. In the new one, this is simply described as "doubtful" area—but it's understood to include alterations, major repairs, relocation of existing facilities, changeover and other types of maintenance work. At least it frees the building trades unions from potential loss of jurisdiction by the process of definition and prevents them from being backed into a corner from which there is no escape.

Who gets this construction work is to be settled by two-man teams of referees named by both sides, to investigate the jurisdictional disputes and recommend settlement. Eventually, both sides anticipate a final mediation, according to past practice in the areas where the disputes occur.

WALTER REUTHER'S IUD played a key role in plan to end jurisdictional disputes.

In effect, this means that the new proposal cannot be construed to embrace arbitration of basic jurisdiction—which the building trades have feared and to which they have said they would never agree.

AFL-CIO President George Meany describes the agreement this way: "While the procedure does not provide for a definite terminal point, the consensus is that it can be used to settle a great many of the disputes . . ."

Building trades chief Richard Gray told an ENR reporter: "With this agreement we're closer to a final settlement than ever before."

• **Building Trades-Contractors**—It took three years of meetings between the building trades and National Constructors Association to come up with the work practice agreement.

In that time, the joint committee, headed by Mr. Gray for the unions and J. F. O'Connell, vice president of Bechtel Corp., San Francisco, made surveys of extra-cost practices by the unions in such areas as Houston, Galveston and Baton Rouge.

Finally, they came to terms on a list which both sides agreed meant "undesirable costs" to the industry which had grown out of World War II but had not since been eliminated.

While the agreement was worked out with the constructors' association, representing 24 major companies doing heavy industrial construction of refineries, chemical plants, steel plants and the like, it is meant to apply to the entire construction industry. Homebuilding would be included.

The agreement is not enforceable on either side. It is basically a statement that both craft union presidents and industry officials recognize the areas of excessive costs and recommend that they be eliminated. Next step is to get these principles negotiated into local union contracts.

Thinking Big

Baltimore tags its entire downtown area of 1,150 acres for urban renewal

Baltimore's entire downtown section of approximately 1,150 acres has been declared an urban renewal area, thereby making it eligible to receive federal aid for rehabilitation. Oliver H. Winston, director of the Baltimore urban renewal and housing agency, said he believes Baltimore is the first city in the nation to declare the entire downtown as an urban renewal area.

The plan, approved by the City Council, originally was conceived as a 944 acre project, but in its enlarged and revised form it will be joined with two other projects already established. These are the Harlem Park area, for which the Urban Renewal Administration of the Housing and Home Finance Agency has awarded Baltimore a $312,000 planning advance, and the Mt. Royal-Fremont area, for which the city has asked $866,267 in advance planning funds.

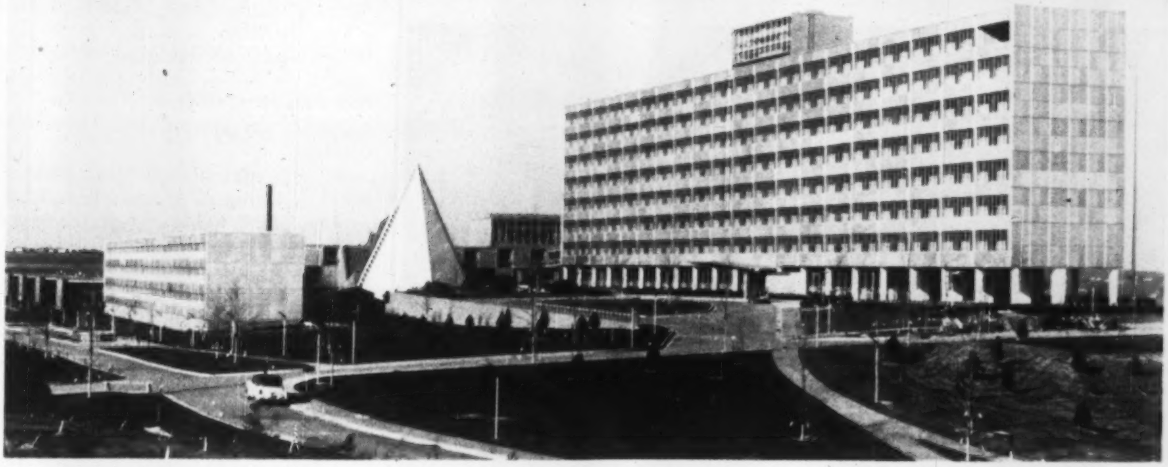
Mr. Winston said there has been no decision yet made whether the city should apply for an advance sufficient to make an urban renewal plan for the 1,150 acres or whether the planning will be done piecemeal within the area.

The tract takes in some of the city's most valuable property and also some of its worst slums. Also contained in the area are two sections that the City Council designated for industrial redevelopment.

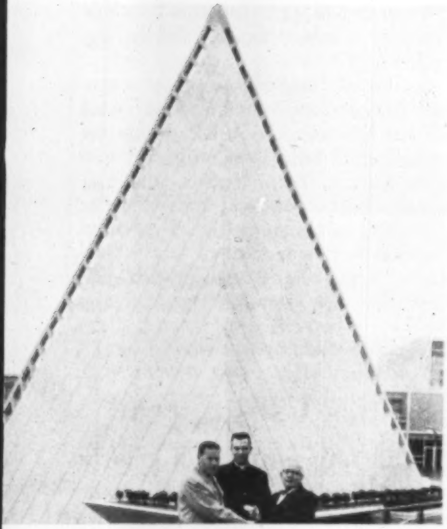
Officials will not estimate the ultimate cost of the project because a master plan for the area will not be completed for at least one year.

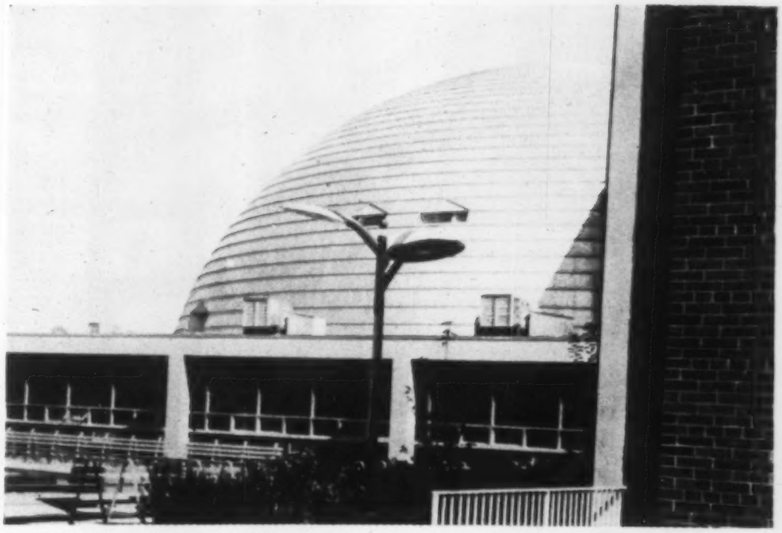
Meanwhile, 75 business and industrial leaders plan a 15 acre privately sponsored renewal project near the center of the area. The group, known as the Greater Baltimore Committee, has appropriated $200,000 to finance work of its 10 member planning staff.

The same committee also has voted to form a new development corporation with a capitalization of $2 million to assist in the city's urban renewal program. The corporation would serve as an agent for getting projects started or it could undertake the redevelopment of blighted areas itself.



Colorful hospital near Pittsburgh, spread out on 126 acres, displays . . .





Pyramidal church of concrete and . . . an auditorium dome, 100 feet in diameter

Novel Shapes Prescribed for Hospital

Box, dome and pyramid shapes enliven the appearance of the $22 million Allegheny County Hospital in Scott Township, Pa., near Pittsburgh.

The main building, an eight-story rectangular structure of reinforced concrete, has metal-pan reinforced concrete slabs for heavy floor loads. Elsewhere, flat slabs or 2 in. concrete on open-web steel joists are used.

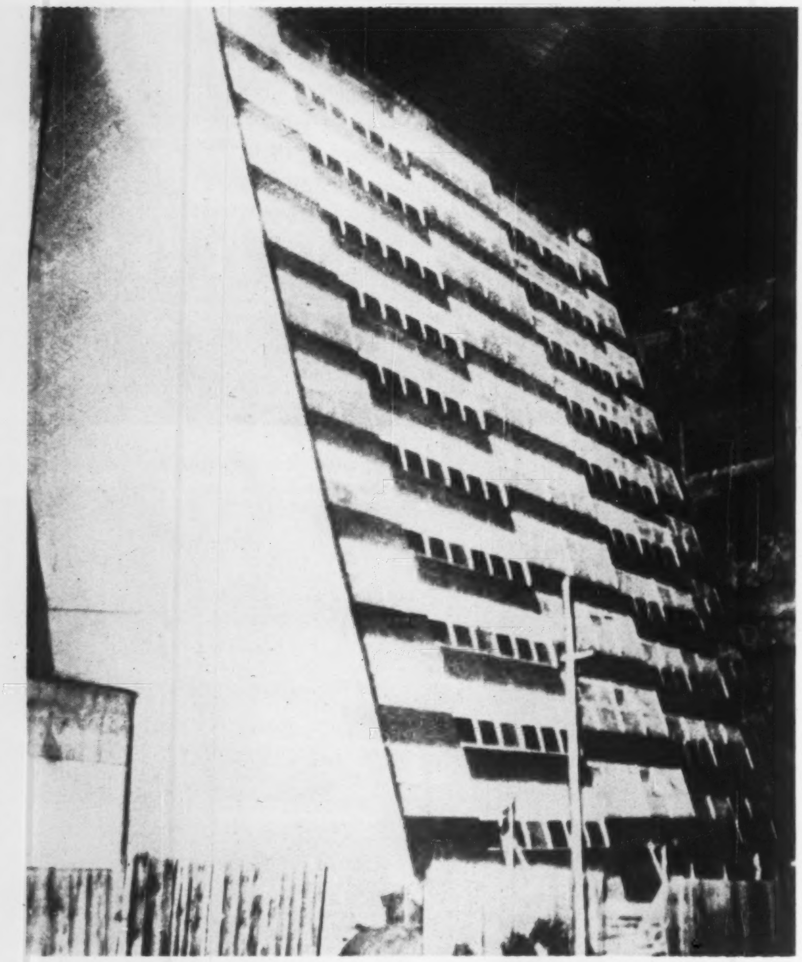
The auditorium roof is a 100 ft dia dome, made of steel and precast concrete slabs covered by aluminum panels.

A pyramid-like church, made of reinforced concrete, is faced with green mosaic tile and copper.

Window walls and a checkerboard design of glass block and glass add variation to the wall systems.

General contractor was Sherry-Richards Co., Chicago. Button and McLean, and Mitchell and Ritchey, Pittsburgh firms, were the architects.

CONCRETE ROOF SLAB is supported entirely by concrete columns spaced 21 ft apart in center of corridor. The 2,100 bed hospital has 11 interconnected buildings.



11 Story Building Turns Over

A newly constructed 11 story reinforced concrete building overturned in Rio de Janeiro January 30 at the end of a six-day last-ditch effort by engineers to save the structure.

Under construction since 1955, the building—known as the Sao Luis Rei—had not yet been occupied, and ample warning of the impending failure allowed evacuation of other buildings in the area. No one was injured.

The cause of the collapse, one engineer said, was that "either the piles were too short or they were improperly constructed." The 95 x 39 ft structure was supported by 99 concrete piles sunk to a depth of 69 ft. Soil at the site, which was reported to have been a quagmire at one time, was composed of organic clay and peat. It was determined after the failure that piles for some neighboring buildings went down 86 ft.

The structure first showed signs of settling in April 1956, when construction crews were up to the tenth floor. Engineers inspected the building at the time and pronounced the movement as "natural." A second movement, described as rather violent, occurred in January 1957, and was again ascribed to the "natural settling process of the building."

Only slight indications of movement occurred from then until January 24 of this year. At that time Frank Pile Co. was called in because the building seemed to be settling badly along the long, rear side of the building. Frank engineers made surveys the next two days and started underpinning work on the 27th. The next day around-the-clock work by a 40 man crew was ordered in an attempt to get in the new piles in time. Wednesday morning, January 29, the settlement rate was found to be increasing, and the area, including four adjacent apartment houses of three and four stories, was evacuated. Wednesday night, police halted all work, believing the building's fall to be imminent.

On Thursday morning work was started again, though the rear of the building was now settling at the rate of 4 mm per hr. That evening at 7:25 everyone was ordered away from the building.

At 7:55 pm, the doomed building toppled, taking 20 seconds to fall flat.

The failure follows by just under a year another collapse of an 11 story building in the Brazilian capital. The 1957 crash, which killed nine persons, was laid to careless undermining of the ill-fated building by foundation work on a site next door. The disaster triggered a campaign by the press and other elements, including some engineers, for more stringent building laws and better building design.

One engineer predicted: "If Rio were to get even the slightest earthquake or hurricane, half the city would tumble down like a house of cards" (ENR Aug. 8, 1957, p. 51).

A Brazilian magazine launched a crusade against dangerous buildings, listed 20 that had collapsed in Rio during the preceding 10 years, and made the ominous forecast—borne out by the new failure—that "more will follow." The periodical ran pictures of several leaning buildings, some out of plumb 8 to 12 in. The charge was made that gaps appearing between abutting buildings had been covered up to conceal the dangerous condition.

Plastics Uses Spread

Society confers on growth of building applications

New uses for reinforced plastics, together with improved applications of those already in use, are finding rapidly expanding markets in the construction industry, especially in buildings.

These facts were brought out last week in Chicago at the 13th annual conference of the Reinforced Plastics Division of the Society of the Plastics Industry.

Last year the construction industry used about 15% of the total volume of reinforced plastics produced in this country. In round figures construction consumed 25 million lb. Industry leaders predict that construction will use from 10% to 15% more reinforced plastics this year than during 1957.

The bulk of the 25 million lb. of reinforced plastics used in construction last year went into flat and corrugated paneling. Most of it was used for industrial and residential construction. Applications that show considerable promise of substantial future volume include sandwich-type curtain-wall construction, waffle pans for forming concrete, and concrete block and ceiling tile surfaced with reinforced plastics.

Road Embargo Lifted

Vermont allowed to take bids for federal-state roads

The U.S. Bureau of Public Roads has partially lifted its embargo on federal aid for highway construction in Vermont, now will permit the state to seek bids on federal-state road projects estimated to cost less than $1.5 million each.

The embargo has been in effect since October 18, 1957, when BPR held that the Vermont State Highway Department had violated a rule guaranteeing open and competitive bidding on federal-aid jobs. The Vermont officials had banned two Minnesota firms from bidding after the firms had taken an option on a stone quarry and then sold it at a profit to low bidder on an interstate highway project. State officials said that this violated an unwritten understanding in Vermont that such options would be turned over at cost by losing bidders to the successful bidder.

BPR held that this action not only restricted bidding but also ruled that Vermont's contention was unsupported by the evidence on the state's own rules. However, until the question is fully settled and the entire embargo lifted BPR has decided to release funds for projects under $1.5 million. This was done after the two Minnesota firms had assured him, said F. C. Turner, deputy commissioner of BPR, that they were not interested in bidding on contracts of less than $2 million in Vermont.

Contracting Firm Acts To Enter Redevelopment

F. H. McGraw Co. is the third firm to enter the bidding for Hartford's first urban renewal project. The company offered the Hartford (Conn.) redevelopment agency two plans: one for an 11 acre site, the other for 17 acres.

In McGraw's 17 acre plan, the redevelopment would cost $40 million to $50 million and include three 16 story office buildings, a single court-type office structure, underground parking for 5,550 cars, an intercity bus terminal, and a number of small retail stores and shops.

McGraw has not proposed a purchase price for the land, unlike the two other bidders. The company wants to negotiate with the redevelopment agency, taking advantage of a recent ruling permitting negotiation on land purchases.

Webb & Knapp has offered the agency $3 million and Hegemann-Harris $2.45 million, the assessed value of the property (ENR Dec. 12 '57, p. 141).

A company spokesman said that McGraw's decision to step out of its usual role of contractor and become the project's developer is in part a result of the company's familiarity with the area in and around Hartford, where the home office is located.

Old Firm, New Name

Raymond Concrete Pile to be Raymond International

Raymond Concrete Pile Co., New York City, this week announced plans to change its name to Raymond International, Inc. George F. Ferris, president, said the company's present name has a restrictive connotation. Although Raymond is known in this country as a foundation specialist, the company also operates abroad as a general contractor undertaking all types of construction. Stockholders will vote on the proposed name change at the annual meeting April 2.

Illustrating the company's activities abroad as a general contractor, Mr. Ferris pointed out that Raymond is prime contractor on the construction of Brasilia, the new $50 million capital city of Brazil. The firm also is building a 300 mile highway in Thailand and is sponsor of the $350 million military base construction in Spain.

Following the change of name, Raymond Concrete Pile Co. will operate as a division of the parent company, and will continue to provide all of its present services.

• **Rapid growth**—Mr. Ferris said that Raymond's foreign operations have grown rapidly, and in the last 10 years, volume in this field quadrupled last year. Income from overseas work accounted for more than half of the firm's total net earnings, which hit a record high of more than $5 million after taxes.

Total new sales in 1957 were $148 million, a 30% increase over 1956. This was attributed primarily to expansion of foreign operations. Five years ago, total new sales were $60 million and 10 years ago the total was $35 million.

• **Operates in 25 countries**—The 60-year-old company has completed nearly 1,300 contracts in more than 50 foreign lands and served more than 220 clients. The aggregate value of Raymond's service in organizing and constructing projects for the U.S. Government totals $1.8 billion.

The company's wholly-owned subsidiaries now are operating in 25 countries on close to 400 contracts. Areas of major activity are Spain, Turkey, Cuba, Canada, Puerto Rico, Thailand, Venezuela, Brazil and Colombia.

Other large projects include a $10 million public works program in Liberia, a $35 million grain silo in Turkey, a power plant in Puerto Rico and oil drilling and production facilities in the Caribbean area and Venezuela.

Briefs

• **Portland Freeway**—Final link in the $15 million T. H. Banfield Freeway connecting downtown Portland, Ore., and the North-South Pacific Highway (U. S. 99) with the Columbia River Highway (U.S. 30) is now open to traffic. The six-lane freeway cuts through Portland in a natural gulch, which also serves as the main line entrance for railroads to the city. A feature is the fact that the freeway costs a little over $1 million a mile. Construction cost was $9.3 million. Land acquisition for the 13 mile link was $5.8 million.

• **New Brooklyn incinerator**—Contracts totaling $7.2 million have been awarded Lasker Goldman Corp., New York, for construction of a new incinerator in southwest Brooklyn. The plant will have a capacity of 1,000 tons a day.

• **Toledo to improve port**—The Toledo-Lucas County Port Authority last week voted to exercise its option to purchase a 65 acre site for port development from the Chesapeake & Ohio Railroad for $228,470. Over $1.4 million dollars will be spent in filling the area and in placing 1,000 ft. of steel bulkheading along the river front. The purchase is to be completed by the end of March with site preparation and dredging operations to begin by the end of April. Bulkhead installation is set to begin in May with an October completion date.

• **Rhode Island reservoirs**—Rhode Island should begin acquiring sites for dams and reservoirs immediately as the first step in a long-range water development program, according to a report compiled for the state by Metcalf & Eddy, Boston. The report recommended acquisition of six reservoir sites, whose development could be phased out and would cost an estimated $22.7 million.

• **Air pollution conference**—A national conference to study the growing problem of air pollution in urban areas will be held this fall in Washington, D. C., called by the U.S. Public Health Service. The conference will consider the many legal, medical and industrial problems involved, and pool the experience already obtained by such cities as Los Angeles, Pittsburgh and St. Louis, in combating air pollution.

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Highlights of the year just started —

- **Public works will offset decline in private contracts** p. 48
- **Project financing will be easier but competition greater** p. 93
- **Labor costs will continue their upward climb** p. 98
- **Trend toward new building shapes and facades will continue** p. 103
- **Interstate roads will hold transportation spotlight** p. 155
- **Water developers will join hands—at last** p. 205

Warning for 1958 Construction:

Growth Ahead

(Concluded from front cover)

The first fact to be noted about 1958 construction is that its total will approximate that of 1957, which has been exceeded in only two previous years. But a second fact, of even more significance, is that forces are at work in the economy to restore its momentum for growth. When that occurs, every ounce of construction's strength—all of its present, powerful assets—will be needed to meet the demand.

Coming economic growth should be taken as a warning and not merely as a happy state of affairs. That may seem paradoxical, and it would be in countries that live by "five-year plans" with targets to be met or missed. But in the U. S., where targets are never limited and seldom stated, where growth is the heart and soul of economic philosophy, construction must be ready for any pace that may be set.

Under such a philosophy a slowdown is not a setback, but must be used as a rest period to prepare for the faster pace that is sure to follow. This is such a period, and the responsibility for construction to be prepared for increasing need for its services is plain.

The highway field is a case in point. Not only did the interstate program, despite ample funds, get off to a slower start in 1957 than many had hoped, there is now talk that the program is not big enough and must be expanded. Construction must be ready to handle at least 10% more road work than last year, by far the largest in history.

Sanitary facilities—water supply and sewerage—are being forced to a faster pace by increasing urban population and new communities. At least a 10% increase must be planned for here.

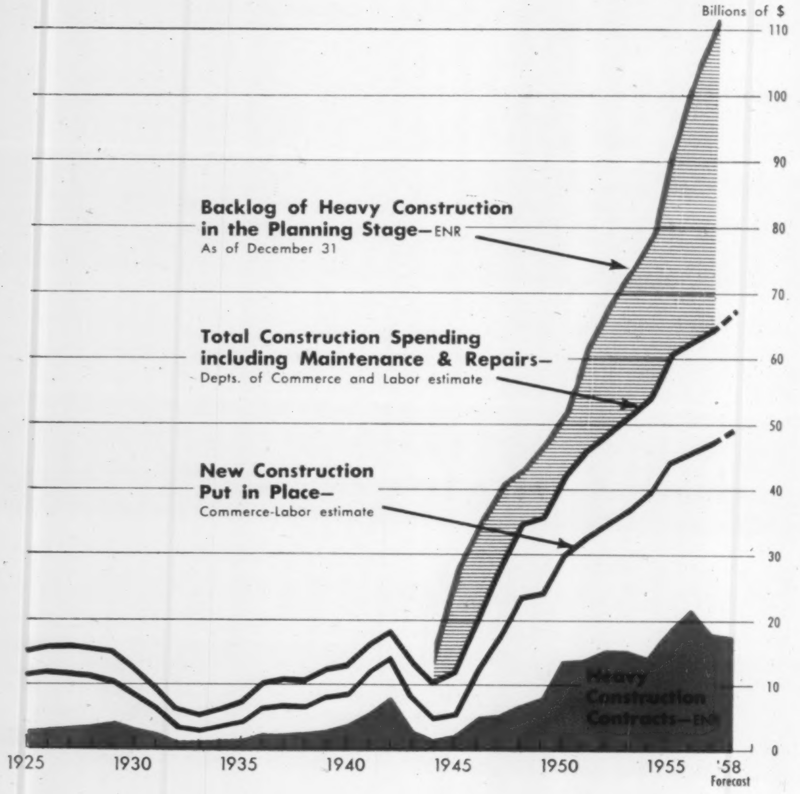
Housing, slowed by rising interest rates, will move faster under the better credit terms already being offered. Continuing population and family formation increases, on top of normal replacement needs, give this field certain motive power.

The electric utilities, and to a lesser extent the petroleum industry, will continue to expand, and help to slow the decline in industrial building contracts. If certain lines of manufacturing industry have satisfied their need for new plant, this can only be a short-run need. Such pressures as continued high levels of consumer spending, inventory depletion, new defense contracts and easier credit are already beginning to exert an influence toward expansion.

Then, added to these types of work for which the construction industry must be prepared, there are the new requirements in missile bases, and the probability that an election year will see no less, and perhaps more, activity in public building work and in river development construction.

The construction industry's job for 1958 is to operate at the same substantial rate as in 1957, but be prepared for the faster pace that growth forces in the economy are forging. This is the warning that rest periods in the U. S. economy have always engendered. For construction they pose a challenge. And favored by its powerful assets, the industry can prepare to meet it with confidence.

The Construction Market: Review of '57 . . .



Construction contracts skidded 17% below 1956's boom total to $18 billion, third highest year on record

Spending for new construction put in place and for maintenance and repairs rose to a new high estimated at $64.3 billion.

Costs continued to rise because of 4-pronged push by increased prices of materials, labor, machinery and money

Contractors' selling prices advanced with rise in costs, but like costs, the rate of increase was less than during 1956

Materials shortages were erased as demand tapered off and production capacity increased . . . some prices dropped, others advanced at a slower pace than in '56

Labor unions won larger increases in '57 than '56 . . . though employment fell below a year-ago late in '57

Machinery orders held close to '56 record, but failed to meet expectations because of the drop in private construction . . . price increases were less than in '55 and '56

Money available to finance construction fell short of demand . . . borrowing costs rose to their highest in more than thirty years, then turned lower at year's end

HEAVY construction was a two-faced market in 1957. On one side, public works contracts boomed 17% above their previous high in 1956. But on the other, private construction awards shrank 38% below the '56 boom total.

As big as the boom in public was, it could not offset the steel decline in private works so the total volume of contractors' new business fell to $17,986 million. This is a drop of 17% from the all time high chalked up in 1956. It is also the third largest volume ever recorded by ENR, narrowly missing 1955's total by a slim margin of 4%.

The slackening in demand for new construction last year helped to erase shortages of some materials—notably structural steel—and machines. And because the productive capacity of many of the industry's suppliers was increased by expansion programs, substantial margins of capacity in supporting industries showed up as the year came to a close—notably in steel, lumber, machinery, gypsum and cement.

Manufacturers sales of many materials and machinery lines fell short of expectations last year, reflecting the drop in private mass housing 43%, industrial building 42%, commercial building 14%, and other private work 10%. Moreover, 1957 shipments declined below '56 totals for makers of steel, cement, lumber, asphalt roofing and siding, some aluminum mill products, brick clay, sewer pipe, structural clay, tile and construction machinery.

Reduced demands resulted in somewhat smaller price increases for materials in '57 than in '56. This plus the improved delivery on new orders of items which had been in short supply during '56 contributed to a slowdown in the 1957 construction cost rise.

Offsetting the slowdown in materials price advances during 1957 were very substantial wage increases for construction workers. Last year's wage hikes were considerably greater than corresponding '56 raises. Construction machinery price indexes also added their weight to the 1957 cost rise, though prices moved up less on the average then they did in 1956.

• **New records**—The 1957 boom in public works was sparked by new all time highs for waterworks up 4% highways up 20%, bridges up 26% and earthwork—dams-waterways—up 33%. Moreover, sewerage awards came within 4% of their 1956 record and additional strong support came from public building and Air Force construction.

Public building other than housing scored a big increase for the second consecutive year. Public housing received a big lift from the Capehart military housing program which moved into high gear once it got off the ground. These projects almost single-handedly pushed 1957 public housing to more than double the '56 total.

Air Force projects dominated the military construction market in 1957. A sharp 41% rise in contracts for airstrips to $184 million held the total for airbase and related facilities to $558 million—within 2% of the '56 total.

The 1957 increase of 21% for highway and bridge contracts combined was largely due to the interstate highway program. However the $1,075 million in interstate projects reported by the Bureau of Public Roads represented only about 30% of this ENR total. This was less than the $1,350 million in awards for "ABC" projects (primary, secondary and urban highways).

. . . and ENR's Forecast for 1958

Construction contracts are forecast at $17.6 billion for 1958, 2% less than 1957 . . . state and local public works to take up the slack in federal and private awards, with new highs predicted for waterworks, sewerage, highways and earthwork-dams-waterways

Spending for new construction, maintenance and repairs is forecast at a record $67.6 billion, up 5% over 1957 . . . outlays for new construction put in place are estimated at $49.6 billion, which counts on a 6% rise in new home construction

Costs will rise again as wage increases provide most of the push and materials price advances also contribute . . . but the cost rise will lose momentum *see page 64*

Contractor Selling Prices will rise under pressure of cost increases, but keen competition will hold selling prices to a smaller increase than in '57 *see page 64*

Materials prices will increase on cement and steel, though by smaller amounts than in '56 or '57 . . . a few materials prices, including lumber will dip, many will be steady . . . good deliveries will prevail *see page 67*

Labor unions will receive another round of wage hikes, many of which are written into existing contracts . . . rising unemployment could bring lower demands for wage provisions in contracts negotiated this year *see page 66*

Machinery orders will do well too if they equal 1957 . . . deliveries will be excellent in the first half of '58 . . . prices will be relatively steady for the first time in three years *see page 67*

Money for financing construction will be more readily available and will pay lower interest costs on new loans or bond issues *see page 93*

Heavy Construction Contract Awards Forecast

As reported by Engineering News-Record in millions of dollars

By Ownership & By Type of Work	Actual 1956	Actual 1957	Forecast 1958	Change, % '56-'57	'57-'58
U. S. Total	**$21,712**	**$17,986**	**$17,625**	**−17**	**− 2**
By Ownership—					
Private	13,490	8,386	7,500	−38	−11
Public	8,222	9,600	10,125	+17	+ 5
State & Municipal	6,533	7,415	8,175	+14	+10
Federal	1,689	2,185	1,950	+29	−11
By Type of Work—					
Public					
Waterworks	356	369	425	+ 4	+15
Sewerage	579	556	625	− 4	+12
Bridges	612	772	750	+26	− 3
Highways	2,475	2,964	3,500	+20	+18
Earthwork, Dams, Hydro, Waterways	729	969	975	+33	+ 1
Building, excl housing	2,099	2,353	2,400	+12	+ 2
Housing	318	642	550	+102	−14
Unclassified (airports, tunnels, military)	1,053	975	900	− 7	− 8
Private					
Mass Housing	5,307	3,041	2,600	−43	−15
Commercial Building	2,051	1,754	1,600	−14	− 9
Industrial Building	5,335	3,081	2,700	−42	−12
Bridges	10	9	10	−10	+10
Unclassified (pipelines, hydro, transmission lines)	787	500	590	−36	+18

• **Public works key to '58**—The heavy construction industry will rely heavily on the expanding public works market for the bulk of new construction contracts in 1958. ENR forecasts this year's contract awards at $17,625 million, 2% under 1957 and fourth highest annual volume.

State and local contracts are expected to climb 10% to a new high of $8.2 billion. This rise will offset predicted declines of 11% in both federal and private work.

Providing the lift for state and municipal construction will be increases of 18% forecast for highways, 15% for waterworks, 12% for sewerage, 2% for public building other than housing and 1% for earthwork-dams-waterways. All of these types of work except public buildings are expected to set new highs in '58. Excluding the $2 billion in atomic energy plant contracts in 1949 and 1952, public building will also set a new record. These increases in public works will offset declines forecast for bridges, public housing and "unclassified" categories.

The outlook for federal construction contracts is for a moderate decrease because of less "Capehart" military housing and a drop expected in '58 awards for federal dams and other types of reclamation, river and harbor development projects.

Making up for the decrease in federal awards for dams and other water resource development will be the huge Niagara power project to be awarded by the Power Authority of the State of New York.

• **Soft spots**—Private heavy construction is forecast down 11% in '58. Mass housing is seen 15% below '57, industrial building down 12% and commercial building off 9%. However, private unclassified (mainly pipelines, electric and telephone transmission lines) should rise out of its two-year slump.

The drop forecast for housing is a reversal of ENR's preliminary forecast of a 6% rise for '58 (ENR Sept. 12, 1957, p. 23). The low volume of housing projects proposed during the last five months indicates a decline in awards this year. The outlook for commercial building has also weakened during recent months.

While the over-all outlook for private work is not "bullish" now, it could brighten rapidly. Some projects are coasting through the planning stage while owners watch the economic barometer and wait. The loosening of the credit reins, indications of more moves to make money more readily available and cheaper to borrow, and federal government's decision this month to unfreeze new starts on water resource development projects—all of these are seeds of greater confidence and an expansion in private construction.

• **Estimated spending up**—Total spending for new construction, maintenance and repair is forecast to rise 5% in '58 on top of last year's 2.7% increase.

Of the $67.6 billion total for '58, $49.6 billion is for new construction put in place as forecast by the U. S. Department of Commerce and Labor. This 5% rise over the estimated $47,255 million put in place last year counts on a 6% increase in outlays for private housing.

Maintenance and repair accounts for the $18 billion balance of predicted spending this year, a rise of 6% over last year's $17 billion (ENR estimates).

Heavy Construction Contract History 1925-57

Reported by Engineering News-Record in millions of dollars and as percent of U. S. totals

											Buildings													
															Commercial									
Year	Waterworks	%	Sewerage	%	Bridges	%	Earthwork, Irrigation—drainage	%	Highways	%	Public	%	Industrial	%	Total Commercial	%	Mass Housing	%	Other Commercial	%	Unclassified	%	TOTAL	ENR Volume Index[a]
1925	$ 71	2.8	$ 85	3.3	$ 70	2.7	$ 62	2.4	$423	16.5	$204	8.0	$228	8.9	$1,176	46.0	....	....	....	....	$240	9.4	$2,559	201
1926	62	2.2	104	3.6	87	3.1	55	1.9	486	17.1	227	7.9	312	11.0	1,277	44.7	....	....	....	....	244	8.5	2,854	228
1927	54	1.7	118	3.6	144	4.4	68	2.1	528	16.2	254	7.8	321	9.9	1,398	43.0	....	....	....	....	368	11.3	3,254	267
1928	100	2.8	101	2.8	133	3.7	74	2.1	617	17.3	292	8.1	355	9.9	1,596	44.6	....	....	....	....	313	8.7	3,579	287
1929	49	1.2	88	2.2	137	3.5	77	1.9	542	13.8	356	9.0	547	13.8	1,670	42.4	....	....	....	....	484	12.2	3,950	317
1930	49	1.5	83	2.6	131	4.1	77	2.4	585	18.5	356	11.2	331	10.5	1,034	32.6	....	....	....	....	528	16.6	3,173	260
1931	57	2.3	73	3.0	116	4.8	143	5.9	545	22.4	384	15.8	166	6.8	561	23.1	....	....	....	....	387	15.9	2,432	225
1932	35	2.9	25	2.0	84	6.9	101	8.3	380	31.1	241	19.8	93	7.6	166	13.6	....	....	....	....	95	7.8	1,219	133
1933	67	6.3	22	2.1	98	9.2	137	12.8	288	27.0	121	11.3	152	14.2	106	9.9	....	....	....	....	77	7.2	1,068	107
1934	92	6.7	61	4.5	99	7.3	266	19.6	345	25.4	204	15.0	105	7.7	81	6.0	....	....	....	....	107	7.8	1,361	120
1935	81	5.1	100	6.3	98	6.2	259	16.3	325	20.4	298	18.7	172	10.8	109	6.8	....	....	....	....	148	9.3	1,590	143
1936	92	3.8	121	5.1	188	7.9	182	7.6	483	20.3	436	18.3	309	12.9	275	11.5	....	....	....	....	300	12.6	2,387	201
1937	104	4.3	95	3.9	133	5.5	110	4.5	415	17.0	333	13.7	477	19.6	460	18.8	$324	13.3	$136	5.5	309	12.7	2,438	189
1938	131	4.7	136	4.9	135	4.8	268	9.6	638	22.8	503	18.0	152	5.5	550	19.7	416	14.9	134	4.8	279	10.0	2,792	213
1939	163	5.4	160	5.3	151	5.0	233	7.8	644	21.4	593	19.7	283	9.4	388	12.9	273	9.1	115	3.8	390	13.0	3,003	228
1940	70	1.8	91	2.3	120	3.0	234	5.9	678	17.0	1,196	30.0	594	14.9	400	10.0	269	6.7	131	3.3	603	15.1	3,987	299
1941	77	1.3	89	1.5	112	1.9	245	4.2	583	9.9	2,786	47.4	496	8.5	486	8.3	376	6.4	110	1.9	996	17.0	5,869	430
1942	151	1.6	118	1.3	50	0.5	251	2.7	531	5.7	5,678	61.1	200	2.2	292	3.1	279	3.0	13	0.1	2,034	21.8	9,306[b]	546
1943	46	1.5	41	1.3	26	0.9	47	1.5	227	7.4	1,419	46.4	167	5.5	231	7.5	229	7.5	2	...	858	28.0	3,062[c]	204
1944	33	1.9	32	1.8	17	1.0	64	3.7	196	11.3	658	38.2	174	10.0	140	8.1	132	7.6	8	0.5	416	24.0	1,730	110
1945	61	2.7	35	1.5	53	2.3	57	2.5	227	9.9	463	20.4	635	27.7	387	16.9	253	11.1	134	5.8	371	16.2	2,289	146
1946	109	2.1	114	2.2	129	2.5	328	6.3	769	14.9	414	8.0	1,113	21.5	1,846	35.7	1,518	29.3	328	6.4	354	6.8	5,176	298
1947	139	2.5	175	3.1	196	3.5	327	5.8	794	14.0	615	10.9	862	15.2	1,898	33.5	1,578	27.9	320	5.6	652	11.5	5,659	271
1948	209	2.9	228	3.2	303	4.2	519	7.2	996	13.8	1,161	16.1	1,096	15.2	1,888	26.1	1,359	18.8	529	7.3	820	11.3	7,219	304
1949	207	2.5	277	3.4	357	4.4	524	6.4	897	11.0	1,736	21.3	950	11.7	2,406	29.4	1,833	22.4	573	7.0	803	9.8	8,157	345
1950	215	1.6	287	2.2	369	2.8	417	3.1	1,268	9.5	3,754	28.1	1,683	13.6	4,092	30.7	3,117	23.4	975	7.3	1,256	9.4	13,342	549
1951	209	1.5	335	2.5	316	2.3	505	3.7	1,167	8.6	2,701	19.9	4,124	30.3	2,632	19.3	2,032	14.9	600	4.4	1,617	11.9	13,605	522
1952	231	1.5	304	2.0	413	2.7	496	3.2	1,397	9.2	4,499[d]	29.4	2,722	17.8	3,845	25.2	3,002	19.7	843	5.5	1,381	9.0	15,289	577
1953	247	1.6	431	2.8	752	5.0	375	2.5	1,792	11.8	2,112	13.9	3,178	21.0	4,621	30.4	3,464	22.8	1,157	7.6	1,662	11.0	15,171	506
1954	245	1.7	388	2.7	510	3.5	339	2.4	1,919	13.3	2,017	14.0	1,876	13.0	5,653	39.2	4,232	29.4	1,421	9.8	1,465	10.2	14,412	481
1955	314	1.7	402	2.1	545	2.9	546	2.9	2,137	11.4	1,987	10.6	2,951	15.7	7,794	41.5	6,138	32.7	1,656	8.8	2,046	10.9	18,722	600
1956	356	1.6	579	2.7	622	2.9	730	3.3	2,475	11.4	2,417	11.1	5,335	24.6	7,358	33.9	5,307	24.4	2,051	9.5	1,841	8.5	21,712	671
1957	369	2.1	556	3.1	781	4.3	969	5.4	2,965	16.5	2,995	16.6	3,081	17.1	4,795	26.7	3,039	16.9	1,757	9.8	1,475	8.2	17,986	517

[a] 1913=100. Measures value of contracts in constant 1913 dollars.

[b] Total overstated by $1,300 million of contracts canceled by War Production Board.

[c] Excludes $1.357 million for atomic plants.

Mass Housing and Public Nonresidential Building Contracts 1947-57

Reported by ENR, in millions of dollars (Parts may not add up to totals because of rounding)

	Private Mass Housing					Public Mass Housing				Public Nonresidential Building			
						State & Mun.		Federal			Federal		
	One-Family	Apartments	Hotels & Motels	Institutions	Total	Slum Clearance	Other	Military	Total	State and Mun.	Industrial	Other	Total
1947	$979	$568	$17	$14	**$1,578**	$30	$47	$35	**$111**	$316	$16	$172	**$504**
48	881	436	20	22	**1,359**	112	36	26	**174**	659	1	328	**988**
49	1,187	595	18	34	**1,833**	260	53	55	**367**	889	247	232	**1,368**
1950	2,186	789	89	53	**3,117**	282	56	21	**359**	1,111	2,072	212	**3,395**
51	1,774	209	20	29	**2,032**	552	25	67	**644**	1,213	582	262	**2,057**
52	2,676	252	36	37	**3,002**	478	25	103	**606**	1,131	2,471	291	**3,893**
53	3,107	257	49	51	**3,464**	308	38	29	**376**	1,328	276	132	**1,736**
54	3,758	381	46	47	**4,232**	150	57	47	**255**	1,492	183	87	**1,762**
1955	5,650	364	38	87	**6,138**	127	57	62	**246**	1,343	240	158	**1,741**
56	4,812	328	65	102	**5,307**	119	112	87	**318**	1,822	124	153	**2,099**
57	2,509	264	157	108	**3,039**	182	102	358	**642**	1,976	152	225	**2,353**

Industrial Building Boom Fades in 1957

Reported by ENR, in thousands of dollars

	1954		1955		1956		1957	
Industry	No.	Value	No.	Value	No.	Value	No.	Value
Transportation Service								
Railroad	18	$10,485	16	$8,911	22	$17,221	14	$9,453
Automotive	152	41,393	121	39,918	121	36,528	97	46,586
Public Utilities	87	348,037	108	729,248	150	1,201,312	113	777,700
Process Industries[1]	414	728,686	459	1,174,462	549	1,785,691	496	1,084,371
Food Industries[2]	407	180,357	227	108,181	319	156,033	220	147,974
Metal Refining & Rolling	24	72,939	30	116,731	55	927,117	35	226,126
Metal Working Plants								
Auto	27	36,065	33	174,826	28	288,359	13	52,330
Aircraft	35	41,855	51	39,289	79	161,987	71	75,102
Foundries	8	1,687	10	3,747	10	7,089	9	1,668
Mach. & Mach. Parts	369	218,806	355	271,923	537	483,605	435	422,807
Radio, TV & Electronics	17	5,901	26	20,417	25	17,384	40	40,141
Textiles (excl. rayon)	45	20,185	37	29,117	19	7,484	15	3,464
Wood Industries	49	13,638	41	13,912	26	30,809	24	8,958
Miscellaneous								
General Factories	595	153,667	559	218,713	642	212,923	558	183,003
Refrig. & Cold Stor.	10	2,608	9	1,383	4	1,240	7	1,335
Total, priv. financed	**2.257**	**$1,876,309**	**2,082**	**$2,950,778**	**2,586**	**$5,334,782**	**2,147**	**$3,081,018**
Fed. Owned Plants	**151**	**$183,260**	**145**	**$240,144**	**135**	**$124,534**	**128**	**$151,648**

[1] Includes distilleries.

[2] Includes breweries, frozen food plants and lockers.

Unclassified Contracts Down Again in 1957

Reported by ENR, in thousands of dollars

	1953	1954	1955	1956	1957
Private					
Transmission Lines	$54,233	$39,082	$50,848	$39,862	$32,705
Pipelines	525,933	379,146	324,287	261,672	257,379
Railroads	39,501	12,296	47,462	34,497	31,509
Telephone	22,783	20,152	36,507	15,886	16,516
Drive-in Theatres	2,938	7,786	1,730	919	619
Radio & TV	15,899	5,833	4,727	8,063	5,639
Airports	9,786	1,145	4,695	13,890	8,868
Other[1]	186,096	119,558	454,316	412,526	146,527
Total Private	**857,169**	**584,998**	**924,592**	**787,315**	**499,762**
Public—Federal					
Airports, Airbases	125,821	171,806	190,150	130,371	184,069
Hangers, Buildings	248,402	240,620	286,943	218,499	212,718
Airport Housing	25,736	28,240	49,676	78,313	53,838
Airport Facilities & Util	85,179	95,556	133,002	142,864	107,653
Shipyards	38,627	5,787	17,822	19,318	18,011
Other	68,516	94,000	135,174	150,166	86,732
Total Federal	**592,281**	**636,009**	**812,767**	**739,531**	**663,021**
Public—State & Municipal					
Airports	41,251	25,904	50,957	97,313	89,788
Subways, Tunnels	36,310	92,084	123,222	82,366	45,011
Other	135,483	125,570	134,540	134,252	176,920
Total State & Municipal	**213,044**	**243,558**	**308,719**	**313,931**	**311,719**
Total Public	**805,325**	**879,567**	**1,121,486**	**1,053,462**	**974,740**
Total Unclassified	**$1,662,494**	**$1,464,565**	**$2,046,078**	**$1,840,777**	**$1,474,502**

[1] Includes private-owned hydro-electric power plants.

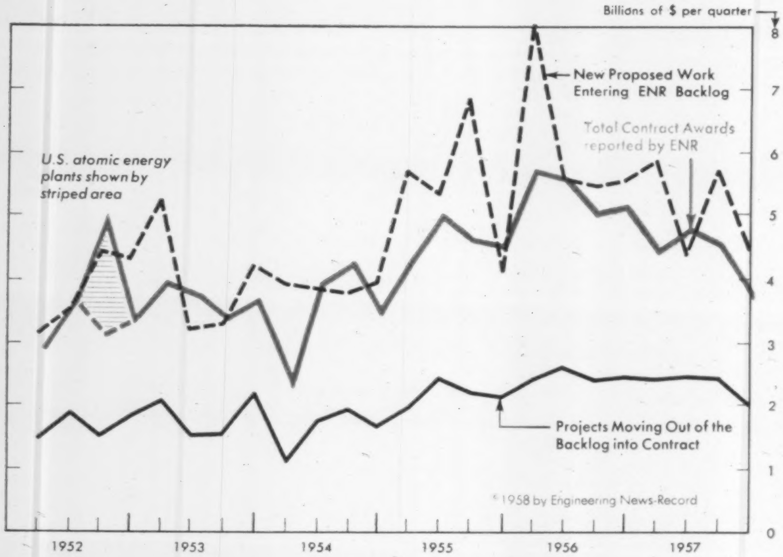
Construction Contracts Have Third Best Year in '57: $18 Billion

Total heavy construction contracts drop 17% under 1956's boom total, but public works awards set new highs

Thousands of Dollars (000 omitted)

	Public Works Contracts									Private Contracts							
						Buildings					Commercial Buildings		Construction				
States	Water-works	Sewer-age	Bridges*	Earth-work irr.-drain	Streets and roads	Resi-dential	Other	Unclassi-fied†	Federal govern-ment work	Industrial buildings	Resi-dential	Other	Private	Public	1957 Total	1956 Total	% Change '56-'57
UNITED STATES																	
1957	**369,027**	**556,038**	**781,413**	**969,393**	**2,964,563**	**641,812**	**2,352,732**	**1,474,502**	**2,184,898**	**3,091,018**	**3,033,703**	**1,756,644**	**8,385,553**	**9,600,292**	**17,985,845**	....	−17
1956	356,453	578,795	621,917	729,523	2,474,613	317,779	2,099,455	1,840,777	1,688,578	5,334,782	5,303,784	2,051,103	13,490,350	8,221,631	....	21,711,981	....
% Change	+4	−4	+26	+33	+20	+102	+12	−20	+29	−42	−43	−14	−38	+17	**−17**	....	....
NEW ENGLAND																	
Me	423	702	3,211	1,065	13,085	1,587	4,238	13,766	12,773	1,850	6,760	2,976	14,235	35,428	**49,663**	62,405	−20
N.H.	116	671	2,668	160	13,913	15,886	4,209	1,363	17,077	2,604	1,315	6,182	10,101	38,986	**49,087**	49,961	−2
Vt.	129	130	120	8,553	9,705	......	5,786	1,580	10,226	180	1,661	2,822	4,863	25,803	**30,666**	21,594	+42
Mass	4,299	8,842	3,577	19,785	58,237	7,894	70,551	33,804	45,293	117,519	96,008	59,358	275,432	204,442	**479,874**	489,899	−2
R. I.	656	527	5,089	3,042	10,447	1,488	11,304	12,848	17,219	21,364	6,662	9,079	37,180	45,326	**82,506**	52,224	+58
Conn	2,773	11,237	30,997	4,822	59,595	8,191	77,953	11,693	20,959	91,948	110,742	89,516	297,347	202,120	**499,467**	432,151	+16
1957	**8,396**	**22,109**	**45,662**	**37,427**	**164,982**	**35,046**	**174,041**	**75,054**	**123,547**	**235,465**	**223,148**	**169,933**	**639,158**	**552,105**	**1,191,263**	....	+7
1956	7,062	27,742	84,681	35,281	254,965	7,402	143,091	80,685	107,000	180,842	140,737	145,746	472,805	635,428	....	1,108,234	....
% Change	+19	−20	−46	+6	−35	+373	+22	−7	+15	+30	+59	+17	+35	−13	**+7**	....	....
MIDDLE ATLANTIC																	
N. Y.	53,715	48,294	117,504	95,657	259,720	83,370	181,564	131,528	100,098	165,278	432,513	352,798	950,714	971,227	**1,921,941**	2,185,340	−12
N.J.	3,603	8,301	7,482	3,892	38,952	18,600	87,784	22,292	40,350	95,436	455,558	72,499	626,124	189,275	**815,399**	1,347,934	−40
Pa	11,894	34,477	52,287	13,878	170,253	7,745	125,151	28,228	35,901	150,140	297,666	93,396	542,896	442,219	**985,115**	1,295,867	−24
Md	6,202	8,904	9,533	3,784	40,745	30,006	105,865	13,418	69,726	37,909	81,328	34,955	158,435	214,214	**372,649**	550,183	−32
D. C.	1,693	4,875	6,400	444	7,140	11,106	42,202	1,811	40,417	1,578	18,479	29,402	50,459	74,671	**125,130**	102,257	+22
Del		1,166	1,131	2,206	14,289	10,691	21,000	2,332	13,489	7,388	55,424	3,438	67,280	52,815	**120,035**	114,222	+5
1957	**77,107**	**106,017**	**194,337**	**119,861**	**531,099**	**161,518**	**563,556**	**199,609**	**299,981**	**457,729**	**1,342,988**	**583,518**	**2,395,908**	**1,944,421**	**4,340,329**	....	−23
1956	59,341	194,399	98,088	134,374	372,861	107,761	513,364	258,429	242,938	989,340	2,009,183	858,663	3,895,555	1,700,248	....	5,595,803	....
% Change	+30	−45	+98	−11	+42	+50	+10	−23	+23	−54	−33	−32	−38	+14	**−23**	....	....
SOUTH																	
Va	591	3,373	13,881	716	67,394	16,369	30,764	20,748	51,145	23,911	14,513	13,879	52,413	153,726	**206,139**	403,629	−49
W. Va	......	1,191	3,092	1,507	19,287	606	14,307	4,596	2,345	12,802	......	8,700	25,482	40,606	**65,088**	285,423	−77
N. C.	3,751	8,791	19,324	852	49,186	26,085	11,929	11,814	39,146	10,058	773	1,295	13,100	130,758	**143,858**	149,961	−4
S. C.	160	......	8,451	12,286	24,231	14,271	10,265	25,146	47,182	39,697	2,815	1,753	44,611	94,464	**139,075**	93,358	+49
Ga	6,530	4,188	4,081	16,419	44,816	18,088	50,422	11,292	32,789	8,946	4,475	7,600	21,371	155,486	**176,857**	88,418	+100
Fla	6,789	11,232	26,743	10,281	67,006	34,415	61,699	38,401	64,785	105,726	143,355	22,811	275,399	253,759	**529,158**	421,258	+26
Ala	1,310	569	4,309	4,523	31,297	15,974	49,812	19,263	59,387	84,471	5,131	5,855	102,207	120,307	**222,149**	332,829	−33
Miss	......	......	1,258	5,016	47,965	1,663	861	13,835	21,818	6,000	......	5,431	11,431	70,598	**82,029**	71,684	+14
La	7,951	8,744	9,538	26,652	48,019	47,104	29,543	49,067	86,513	77,659	37,254	12,415	140,058	213,888	**354,311**	336,285	+5
Ky	1,000	6,247	599	8,352	44,790	38,532	29,094	6,431	45,677	46,627	8,685	10,413	68,229	132,541	**200,770**	199,121	+1
Tenn	1,088	2,813	3,476	1,917	55,691	2,941	42,712	5,871	20,807	12,115	1,601	8,024	21,740	116,509	**138,249**	174,239	−21
1957	**29,170**	**47,148**	**94,752**	**88,521**	**499,682**	**216,048**	**331,408**	**206,164**	**471,594**	**428,012**	**218,602**	**98,176**	**776,041**	**1,482,642**	**2,258,683**	....	−12
1956	35,908	74,886	116,052	118,972	390,218	43,541	274,625	240,059	395,651	895,208	241,220	125,516	1,300,972	1,255,233	....	2,556,205	....
% Change	−19	−37	−18	−26	+28	+396	+21	−14	+19	−52	−9	−22	−40	+18	**−12**	....	....
MIDDLE WEST																	
Ohio	24,178	54,347	10,916	3,569	185,658	16,867	88,491	57,117	10,970	451,539	262,025	121,702	875,878	400,531	**1,276,409**	1,288,957	−1
Ind	3,786	19,668	9,201	1,001	28,801	708	33,539	10,299	5,933	245,773	19,274	26,061	296,930	101,181	**398,111**	864,274	−54
Ill	15,554	48,118	135,921	6,877	324,248	15,468	97,570	47,584	31,498	207,754	129,179	127,685	500,558	655,400	**1,155,958**	1,083,194	+7
Wis	5,711	22,187	7,943	244	51,103	6,300	51,840	9,492	3,422	69,093	6,095	44,974	120,701	154,281	**274,982**	256,110	+7
Mich	34,491	32,071	45,822	34,685	98,223	11,791	128,443	28,682	55,180	80,489	277,692	54,851	418,734	408,506	**827,240**	1,132,357	−27
1957	**83,720**	**176,391**	**209,803**	**46,376**	**688,033**	**51,134**	**399,883**	**153,174**	**107,003**	**1,054,648**	**694,265**	**375,273**	**2,212,801**	**1,719,899**	**3,932,700**	....	−15
1956	66,579	135,215	126,683	29,071	454,753	61,253	411,168	155,223	115,487	1,626,253	1,192,085	366,609	3,241,021	1,383,871	....	4,624,892	....
% Change	+26	+30	+66	+60	+51	−16	−3	−1	−7	−35	−42	+2	−32	+24	**−15**	....	....
WEST OF MISSISSIPPI																	
Minn	4,133	19,164	9,451	2,311	47,276	9,336	50,409	12,851	7,547	74,194	11,203	37,472	126,744	151,056	**277,800**	267,031	+4
Iowa	3,085	6,478	23,720	9,467	81,333	......	27,900	32,406	13,827	13,097	5,312	21,672	68,571	155,899	**224,470**	191,085	+17
Mo.	13,023	7,320	30,120	20,737	51,475	18,955	54,609	15,845	42,112	62,852	48,739	51,726	166,618	208,783	**375,401**	434,636	−14
Ark	3,260	1,128	8,288	6,349	12,473	4,325	5,610	5,462	13,088	50,454	5,750	6,351	64,277	45,173	**109,450**	155,907	−30
N. D.	2,498	1,123	5,304	15,801	27,378	3,334	2,340	38,716	54,638	2,481	1,205	2,326	10,899	91,607	**102,506**	82,459	+24
S. D.	704	534	9,532	39,413	14,835	3,586	4,553	5,737	44,658	934	......	1,557	3,740	77,645	**81,385**	80,959	+1
Neb	1,046	2,830	4,871	7,209	26,451	924	25,682	39,764	14,446	1,707	2,140	10,295	10,947	81,972	**122,919**	151,150	−19
Kan	6,546	6,724	13,732	7,473	41,621	26,010	36,441	8,811	35,892	28,249	5,120	16,919	54,250	143,396	**197,646**	202,120	−2
Okla	3,733	6,620	11,004	2,314	51,433	10,985	29,930	17,792	32,159	65,709	5,717	15,401	95,337	125,301	**220,638**	206,489	+7
Tex	42,838	30,428	17,745	29,302	227,511	25,739	110,175	191,781	109,867	270,185	222,254	158,007	746,865	579,100	**1,325,965**	2,193,948	−40
Mont	1,557	299	4,357	10,960	20,989	......	8,826	18,424	27,502	6,298	......	350	12,785	59,275	**72,060**	113,473	−36
Wyo	567	536	5,840	23,248	27,490	......	8,037	4,031	28,411	2,000	......	372	3,968	68,153	**72,121**	74,448	−3
Colo	3,694	3,113	9,061	3,121	48,699	12,586	30,022	52,467	62,184	11,335	8,262	13,101	39,447	156,014	**195,461**	469,950	−58
N. M.	51	......	7,269	2,867	34,236	2,683	10,740	24,351	31,788	7,860	......	2,692	18,294	74,455	**92,749**	108,829	−15
1957	**86,735**	**86,297**	**160,294**	**180,572**	**713,200**	**118,463**	**405,274**	**468,438**	**518,119**	**597,355**	**315,702**	**338,241**	**1,452,742**	**2,017,829**	**3,470,571**	....	−27
1956	140,940	80,504	108,892	133,693	674,550	69,403	396,283	612,160	440,464	940,578	1,221,281	354,200	2,849,201	1,883,283	....	4,732,484	....
% Change	−38	+7	+47	+35	+6	+71	+2	−23	+18	−36	−74	−5	−49	+7	**−27**	....	....
FAR WEST																	
Idaho	194	82	4,131	4,783	14,290	888	22,264	4,611	30,977	7,751	......	422	8,910	50,506	**59,416**	61,116	−3
Utah	484	6,910	1,409	44,025	15,299	1,658	16,445	25,303	51,535	15,313	5,300	8,140	51,096	89,190	**140,286**	91,358	+54
Ariz	......	2,245	2,350	55,378	20,654	4,619	12,725	20,195	75,486	1,400	1,000	3,000	17,539	105,027	**123,566**	183,227	−33
Nev	......	......	......	37,246	13,810	9,435	5,724	22,662	55,981	......	500	701	17,868	72,210	**90,078**	27,806	+224
Wash	8,427	10,383	30,569	152,802	45,241	5,148	49,742	52,050	82,470	91,703	10,222	25,751	143,688	338,350	**482,038**	541,676	−11
Ore	8,548	2,349	6,547	51,185	39,662	4,076	22,219	22,949	74,909	9,995	995	7,471	26,820	149,176	**175,996**	199,609	−12
Calif	66,246	96,107	31,559	151,217	218,611	33,779	349,441	224,293	293,296	180,647	226,001	143,018	642,982	1,077,937	**1,720,919**	1,989,571	−14
1957	**83,899**	**118,076**	**76,565**	**496,636**	**367,567**	**59,603**	**478,560**	**372,063**	**664,654**	**306,809**	**244,018**	**188,503**	**908,903**	**1,883,396**	**2,792,299**	....	−10
1956	46,623	66,049	87,521	278,132	327,266	28,419	360,924	494,221	387,138	702,561	502,278	200,369	1,730,795	1,363,568	....	3,094,363	....
% Change	+80	+79	−13	+79	+12	+110	+33	−25	+72	−56	−51	−6	−47	+38	**−10**	....	....
CANADA																	
1957	**17,695**	**38,399**	**52,706**	**170,660**	**141,519**	**47,969**	**180,776**	**209,704**	**164,231**	**337,578**	**165,194**	**122,634**	**752,091**	**732,743**	**1,484,834**	....	−30
1956	28,895	48,134	45,284	188,593	140,814	67,199	177,833	496,645	185,384	543,213	223,908	150,143	1,346,449	764,212	....	2,110,661	....
% Change	−39	−20	+16	−10	+1	−29	+2	−58	−11	−38	−26	−18	−44	−4	**−30**	....	....

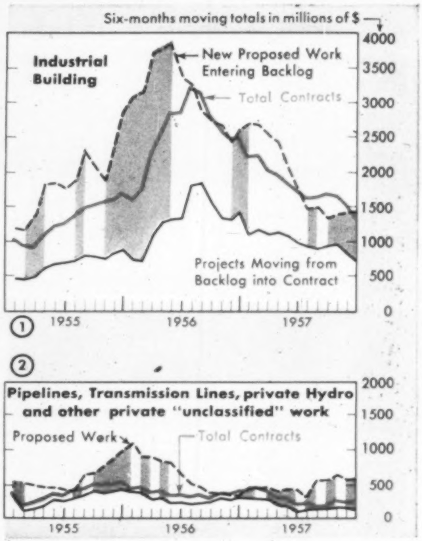
*Incl. private: Bridges, public, $771,987 ('57) $611,551 ('56); private, $9,426 ('57) $10, 366('56) Unclassified, public, $974,740 ('57) $1,053,462 ('56); private, $499,762 ('57) $787,315 ('5



PROJECTS move out of the planning stage into contract at a slower pace. Though new proposed work drops, it holds up better than contracts.

How ENR's Backlog Feeds Future Contracts

	Private Construction (Millions of $)			State & Municipal Construction (Millions of $)			Federal Construction (Millions of $)		
	New Proposed Work Flowing into Backlog	Moving Out of Backlog to Contract	Total Contracts Reported	New Proposed Work Flowing into Backlog	Moving Out of Backlog to Contract	Total Contracts Reported	New Proposed Work Flowing into Backlog	Moving Out of Backlog to contract	Total Contracts Reported
1951 Year....	$10,551	$3,485	$7,436	$4,761	$2,308	$3,923	$3,734	$928	$2,246
1952 Year....	7,979	3,031	7,113	5,453	2,344	4,075	2,121	1,366	4,101
1953 Year....	7,998	3,913	8,665	7,160	2,780	5,087	886	759	1,418
1954 Year....	8,241	2,756	8,125	6,423	2,988	5,001	957	763	1,286
1955 Year....	11,672	4,570	11,673	10,952	3,348	5,415	1,398	927	1,635
1956 Year....	12,825	5,417	13,490	10,804	3,652	6,533	2,014	887	1,689
Jan.....	1,041	346	867	1,913	276	531	163	136	194
Feb.....	1,360	353	1,244	711	240	415	121	76	123
Mar.....	1,487	641	1,633	998	283	585	222	82	161
Apr.....	1,247	499	1,266	576	313	502	162	38	100
May.....	1,554	483	1,287	794	373	640	111	108	193
Jun.....	670	389	896	447	373	597	23	66	129
Jul.....	761	680	1,104	609	310	525	7	96	206
Aug.....	830	410	1,144	565	320	605	758	34	79
Sep.....	976	281	893	760	237	452	214	49	136
Oct.....	996	433	1,142	799	326	608	52	56	129
Nov.....	1,057	391	976	1,846	358	642	59	71	118
Dec.....	846	511	1,038	786	243	431	122	75	121
1957 Year...	8,883	3,505	8,386	9,650	4,580	7,415	1,843	1,283	2,185
Jan.....	1,325	282	742	1,197	422	667	59	127	255
Feb.....	878	396	795	604	323	474	57	92	167
Mar.....	871	273	610	692	324	568	186	181	289
Apr.....	712	255	732	516	327	544	95	118	185
May.....	690	352	803	665	449	712	86	138	341
Jun.....	465	305	730	1,100	434	866	21	100	145
Jul.....	451	242	637	373	436	677	38	162	274
Aug.....	1,045	372	850	1,829	462	792	19	112	163
Sep.....	597	284	644	408	343	527	939	49	76
Oct.....	816	349	867	798	419	703	127	83	130
Nov.....	522	209	565	742	357	560	106	83	107
Dec.....	509	186	410	725	282	505	109	38	52



PRESSURE GAP increases strengthen industrial (1) and unclassified (2) . . .

Pressure gaps reveal . . .

Strong Spots and

The forecast of a 2% decline in 1958 heavy construction (page 49) is based on ENR's record of projects in the planning stage. This backlog of heavy construction rose to a record $111.5 billion in 1957 (page 54).

As projects flow into the ENR backlog other work moves out of the backlog into construction contract. The "pressure gap" between the flow into and the flow out of the backlog affects the future rate of contract awards.

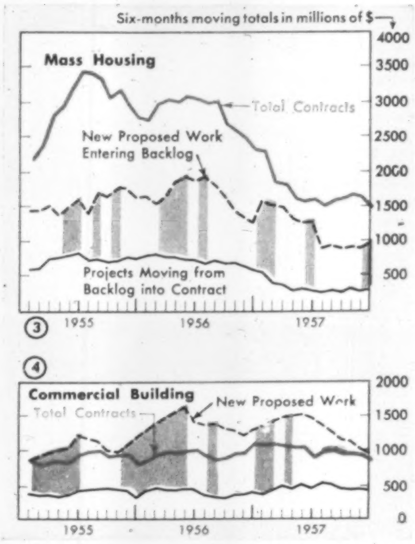
When this gap expands, it forecasts a rise in total contracts because work is piling up in the planning stage and this bulge in work on the drawing boards will create a bulge in contracts in the future.

By contrast, when the "pressure gap" decreases, the drawing boards are being cleared and the smaller volume

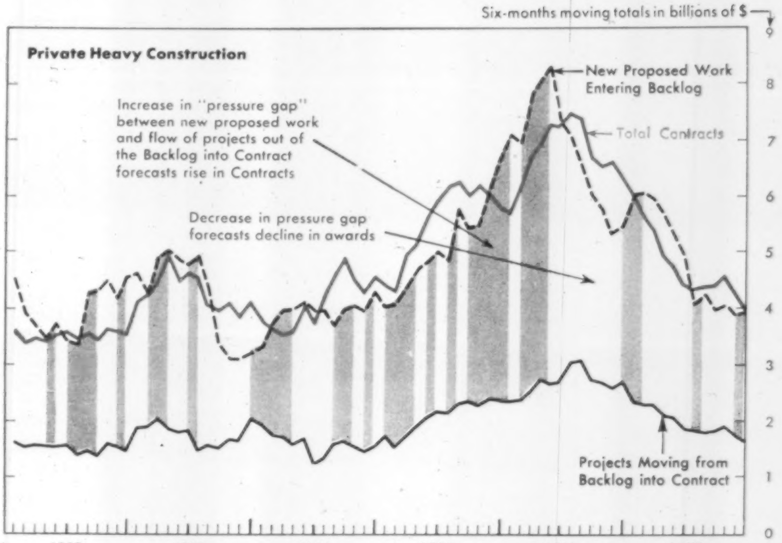
Backlog of Proposed Heavy Construction—1944-1957

Reported by Engineering News-Record, in millions of dollars, as of December 31

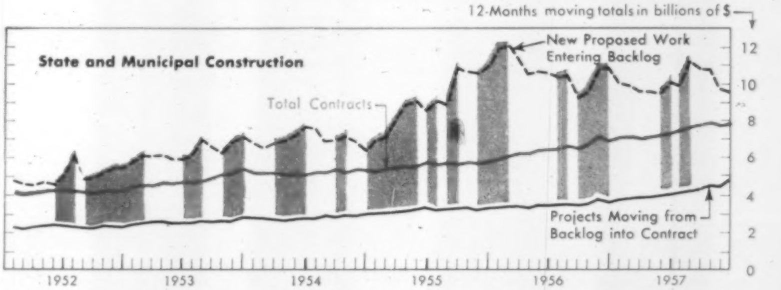
	Public Works Projects										Private Projects				
Dec. 31	Waterworks	Sewerage	Bridges	Earthwork irr.-drain.	Streets and roads	Buildings	Unclassified	State & Municipal	Federal	Total Public	Industrial buildings	Comm'l buildings	Unclassified	Total Private	Total Public & Private
1944.........	$576	$947	$697	$6,487	$2,353	$2,225	$1,993	$8,930	$6,348	$15,278	$183	$790	$364	$1,337	$16,615
45.........	874	1,549	1,141	6,892	3,728	5,805	3,968	15,731	8,226	23,957	1,331	1,901	813	4,045	28 002
46.........	1,131	1,996	1,258	7,543	4,154	7,480	4,291	18,683	9,170	27,853	2,402	3,545	1,758	7,705	35,558
47.........	1,155	2,187	1,362	7,598	4,235	8,424	4,779	20,382	9,358	29 740	3,544	4,644	3,951	11,239	40,979
48.........	1,168	2,180	1,373	7,410	4,005	9,613	4,595	20,953	9,391	30,344	3,939	5,048	3,863	12,850	43,194
49.........	1,199	2,132	1,478	7,450	4,556	10,868	4,653	22,398	9,938	32,336	4,422	5,780	4,728	14,930	47,266
1950.........	1,387	2,182	1,647	7,282	4,598	12,050	4,717	24,109	9,754	33,863	5,753	6,963	5,534	18,250	52,113
51.........	1,432	2,372	1,978	7,444	5,129	13,569	6,507	26,082	12,349	38,431	9,400	7,994	6,322	23,716	62,147
52.........	1,533	2,762	2,217	7,983	5,614	14,737	6,634	28,411	13,069	41,480	10 ,593	9,439	7,216	27,248	68,728
53.........	1,582	2,902	2,288	8,601	7,315	14,994	6,728	31,739	12,671	44,410	10,716	11,306	7,624	29,646	74,056
54.........	1,647	2,916	2,261	9,334	8,599	15 111	6,677	34,184	12,361	46,545	11,740	12,947	8,470	33,157	79,702
1955.........	1,990	2,988	2,682	11,293	11,313	16,405	7,246	41,176	12,741	53,917	14,302	15,767	9,067	39,136	93,053
56.........	2,229	3,214	2,954	11,416	12.672	18,884	9,244	46,971	13,642	60,613	16,139	18,210	9,288	43,637	104,250
57.........	2,422	3,362	3,313	12,370	13,180	20,208	9,702	50,551	14,005	64,556	16,774	20,253	9,899	46,926	111,482



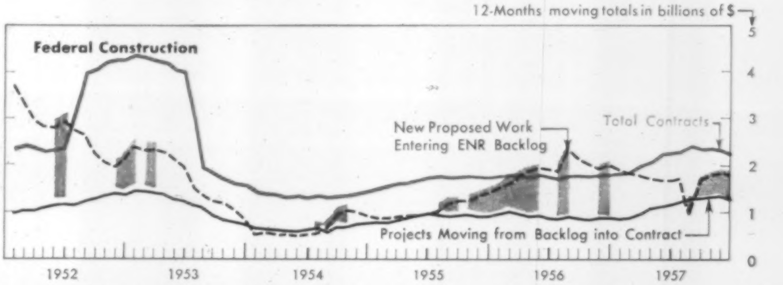
. . . while housing (3) stays weak and commercial (4) weakens . . .



. . . which adds up to a leveling off in proposed private construction and this should cause the contract award trend to level off in '58.



THOUGH THE PRESSURE GAP NARROWS, state and municipal contracts will rise in '58 because of the long lead time for planning.



FEDERAL CONSTRUCTION'S PRESSURE GAP increased late in '57, but it is a much smaller gap than the one a year ago.

Weaknesses

going through the design stage will cause a smaller volume of future construction contracts.

• **Private gap narrows**—The most significant "pressure gap" change in 1957 was the sharp decrease for private heavy construction (see chart at top corner of opposite page). Whereas the steep drop in projects proposed in 1956 appeared to end late in that year, a new and even sharper decline came in the first half of 1957. And while the flow of projects out of the planning stage into contract also slowed in '57, the gap reduced to half its late '55-early '56 peak.

However, since mid-'57 private construction's "pressure gap" has remained relatively unchanged. This forecasts a corresponding leveling off the contract award trend, perhaps during the second quarter.

Support needed to halt the slide in private awards will be furnished by private "unclassified" projects and industrial building (see charts (1) and (2) above). Both of these types of work are in position for a recovery, according to their pressure gaps. In fact, several expansions during 1957 in the pressure gap for "unclassified" brought little response in the way of increasing contracts. So a substantial rise in these awards is now overdue.

Industrial building's pressure gap expanded gradually toward the end of '57 as the downtrend in new proposed work bottomed out but the flow out of the backlog into construction contract slowed. So contracts should stop going downhill in the months ahead.

• **State and municipal strong**—The backbone of contractors' new business in '58 will be state and local public works. Though its pressure gap (middle chart at right) shrank a bit in '57, this will have little effect on '58 awards, because these projects take so long to clear the planning stage.

ENR forecasts that state and local public works awards will rise 10% in '58, compared with a 14% rise in '57. The gain will be primarily due to greater volumes of highway, waterworks and sewerage contracts.

• **Federal boom fades**—The 1956-57 boom in federal construction will taper off in '58. Though the pressure gap (chart above) increased late in '57, it is smaller than in 1956 and the volume of contracts is expected to decrease by 11% this year.

Planned Future Construction: $111.5 Billion Backlog, December '57

Engineering construction, plans underway but construction contract not yet awarded, kept growing in 1957.

Summary of projects on file with ENGINEERING NEWS-RECORD covering proposed construction estimated to cost these minimum amounts or more: waterworks, excavation and irrigation, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, public and private, $344,000.

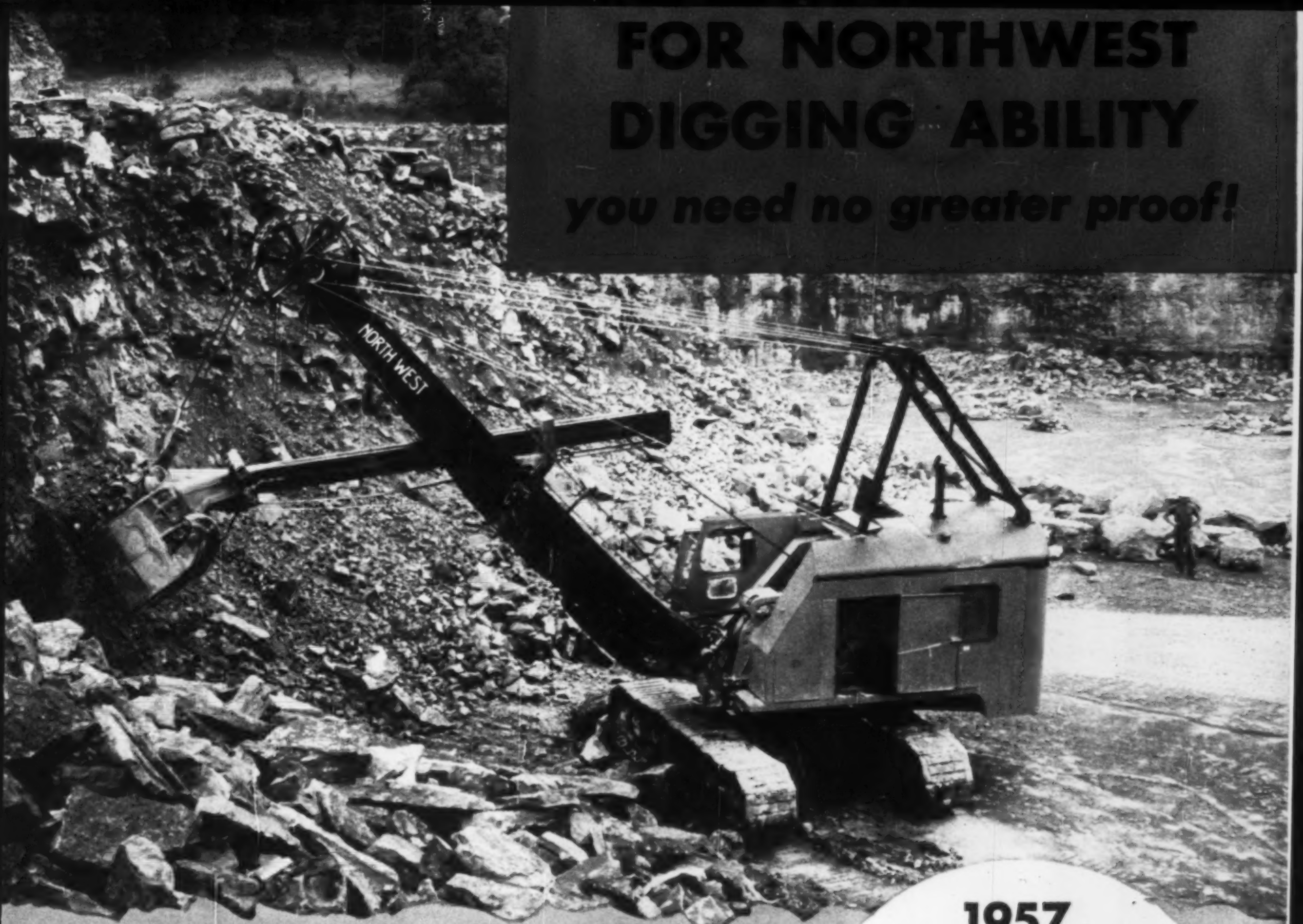
New projects proposed during 1957..............(millions) $20,376
Projects moved out of backlog into contracts .... " 9,367
Projects abandoned and removed from backlog.....(millions) $3,775
Net increase in backlog during 1957............. " 7,234

Thousands of dollars (000 omitted), December 31, 1957

	Public Works Projects								Private Projects			Construction				
States	Waterworks	Sewerage	Bridges (includes private)	Earthwork irr.-drain.	Streets and roads	Buildings	Unclassified	Federal government work	Industrial buildings	Comm'l buildings	Unclassified	Private	Public	1957 TOTAL	1956 TOTAL	% Change '56-'57
UNITED STATES																
1957	2,422,318	3,362,019	3,400,938	12,369,500	13,179,685	20,207,781	9,702,197	14,004,945	16,773,820	20,252,966	9,810,832	46,925,839	64,556,217	111,482,056	....	+7
1956	2,228,871	3,213,841	3,042,625	11,416,584	12,672,205	18,883,668	9,243,719	13,642,025	16,139,231	18,209,688	9,198,708	43,636,557	60,612,583	....	104,249,140	......
% Change	+9	+5	+12	+8	+4	+8	+5	+3	+4	+11	+7	+8	+7	+7	....	......
NEW ENGLAND																
Me	3,267	5,962	7,206	3,435	64,233	62,386	117,925	127,150	24,419	31,741	12,038	68,198	264,414	332,612	282,941	+18
N. H.	3,678	6,893	43,460	3,584	12,709	41,397	31,112	26,662	9,629	23,024	11,216	43,869	142,833	186,702	176,605	+6
Vt	2,262	5,521	1,304	86,961	21,930	28,827	6,771	90,886	3,970	11,950	3,408	19,328	153,576	172,904	170,309	+2
Mass	32,677	64,167	104,477	39,632	1,208,804	717,814	254,733	258,026	108,982	568,542	105,318	783,042	2,422,104	3,205,146	2,926,488	+10
R. I.	6,257	32,260	37,298	2,587	67,822	105,546	47,471	76,188	56,106	54,786	27,459	151,851	285,741	437,592	409,296	+7
Conn	19,020	93,739	104,269	149,083	324,311	644,206	83,897	138,286	220,306	724,346	95,057	1,039,939	1,418,295	2,458,234	2,415,352	+16
1957	67,161	208,542	298,014	285,282	1,699,809	1,600,176	541,909	717,198	423,412	1,414,389	254,496	2,106,227	4,686,963	6,793,190	....	+12
1956	55,946	181,295	301,041	237,111	1,629,950	1,448,071	464,093	609,940	453,976	1,085,634	223,874	1,677,464	4,303,527	....	6,080,991	......
% Change	+20	+15	−1	+20	+4	+11	+17	+18	−7	+30	+14	+26	+9	+12	....	......
MIDDLE ATLANTIC																
N. Y.	173,005	350,298	552,771	834,726	956,700	3,010,758	1,527,046	431,915	813,825	2,394,680	207,767	3,424,068	7,397,508	10,821,576	9,834,034	+10
N. J.	121,837	116,179	241,853	65,807	1,419,962	751,540	315,070	102,546	736,827	803,168	141,026	1,682,222	3,031,047	4,713,269	4,020,291	+17
Pa	35,470	146,861	155,355	304,596	1,447,739	1,033,125	422,091	419,882	1,021,925	1,100,065	267,038	2,393,158	3,541,107	5,934,265	5,183,592	+14
Md	80,972	27,525	5,109	58,034	526,871	267,341	175,993	215,936	276,810	245,578	84,283	606,671	1,141,845	1,748,516	1,774,675	−1
D. C.	5,809	5,394	61,484	1,998	21,242	355,485	43,393	320,962	1,399	401,373	2,492	405,264	494,805	900,069	835,165	+8
Del	2,095	10,263	16,778	45,077	18,752	82,906	17,542	65,106	18,018	103,178	36,000	157,196	193,413	350,609	357,134	−2
1957	419,188	656,520	1,033,350	1,310,238	4,391,266	5,501,155	2,501,135	1,556,347	2,868,804	5,048,042	738,606	8,668,579	15,799,725	24,468,304	....	+11
1956	448,233	599,688	884,642	770,158	3,596,200	5,101,337	2,430,849	1,623,227	2,682,229	4,801,463	690,092	8,186,911	13,817,980	....	22,004,891	......
% Change	−6	+9	+17	+70	+22	+8	+3	−4	+7	+5	+7	+6	+14	+11	....	......
SOUTH																
Va	16,591	60,929	32,992	103,567	214,125	370,961	129,726	369,922	222,966	241,174	89,697	553,837	928,891	1,482,728	1,457,372	+2
W. Va	4,947	49,174	9,996	42,666	33,393	82,256	45,883	81,637	191,222	26,989	22,585	240,971	268,140	509,111	482,121	+6
N. C.	12,815	24,596	10,321	204,496	28,929	179,919	78,316	354,780	191,093	93,565	107,292	392,228	539,114	931,342	1,055,074	−12
S. C.	28,783	16,165	11,694	137,305	32,881	115,097	108,718	250,890	264,433	94,183	51,579	410,195	450,643	860,838	843,140	+2
Ga	25,543	39,757	34,856	99,763	141,516	321,877	95,481	271,138	148,403	133,520	106,951	389,624	758,043	1,147,667	963,282	+19
Fla	14,118	85,950	72,407	30,413	276,500	231,119	130,687	172,792	321,933	563,665	81,737	967,885	840,644	1,808,529	1,661,102	+9
Ala	38,356	47,687	12,614	108,653	88,466	348,753	103,239	343,821	679,149	108,642	226,537	1,014,328	747,768	1,762,096	1,473,193	+20
Miss	10,987	9,788	43,044	19,943	7,431	94,786	78,248	109,472	131,962	37,992	271,560	443,454	262,281	705,735	637,130	+11
La	22,477	26,093	53,044	86,719	70,657	156,274	101,682	202,416	618,821	86,480	495,239	1,201,219	516,267	1,717,486	1,628,906	+5
Ky	11,116	45,407	51,009	59,599	21,619	147,405	23,301	126,388	413,209	108,465	168,998	690,672	359,456	1,050,128	942,028	+11
Tenn	16,357	44,761	69,485	81,897	29,069	392,097	109,872	252,918	319,073	232,508	177,832	729,506	743,445	1,472,951	1,358,922	+8
1957	202,090	450,307	401,462	975,021	944,586	2,440,538	1,005,153	2,536,174	3,502,264	1,727,183	1,800,007	7,033,919	6,414,692	13,448,611	....	+8
1956	192,621	419,423	341,360	966,522	879,088	2,325,849	994,399	2,413,213	3,194,815	1,423,960	1,764,233	6,387,473	6,114,797	....	12,502,270	......
% Change	+5	+7	+18	+1	+7	+5	+1	+5	+10	+21	+2	+10	+5	+8	....	......
MIDDLE WEST																
Ohio	166,350	332,611	166,785	104 364	659,077	1 090,546	202,301	237,923	1,148,947	1,396,706	505,587	3,065,087	2,708,187	5,773,274	5,972,070	−3
Ind	20,566	75,024	87,190	83,108	461,294	403,274	70,862	115,247	751,498	305,037	162,429	1,219,404	1,200,878	2,420,282	2,357,562	+3
Ill	131,806	165,598	274,737	243,669	1,336,616	737,708	340,794	258,659	977,155	1,198,289	252,226	2,444,173	3,214,425	5,658,598	5,246,594	+8
Wis	68,531	33,092	80,266	48,647	98,977	288,369	51,622	117,753	180,894	233,079	56,851	470,924	669,404	1,140,328	1,082,594	+5
Mich	170,074	318,070	204,461	81,808	739,805	1,195,351	166,518	231,435	497,919	758,728	222,620	1,479,267	2,876,087	4,355,354	4,107,079	+6
1957	557,327	924,395	813,439	561,596	3,295,769	3,715,248	832,097	961,017	3,556,413	3,891,839	1,199,713	8,678,855	10,668,981	19,347,836	....	+3
1956	484,717	860,512	733,271	564,340	3,919,380	3,384,601	739,031	919,418	3,656,417	3,291,144	1,132,486	8,111,146	10,654,753	....	18,765,899	......
% Change	+15	+7	+11	−0.5	−16	+10	+13	+5	−3	+18	+6	+7	+0.1	+3	....	......
WEST OF MISSISSIPPI																
Minn	27,596	49,837	27,024	9,629	33,723	225,241	94,304	30,427	131,195	215,114	127,228	475,384	465,507	940,891	836,233	+13
Iowa	6,232	19,530	17,497	65,382	187,338	118,527	11,073	80,508	326,023	108,714	177,544	613,461	424,399	1,037,860	982,670	+6
Mo	54,302	84,275	48,598	194,985	321,778	531,187	85,480	349,740	261,918	373,771	270,328	910,274	1,316,348	2,226,622	2,135,101	+4
Ark	18,341	29,011	23,425	285,474	50,664	146,848	60,968	331,123	293,987	98,777	210,443	603,422	614,516	1,217,938	1,260,187	−3
N. D.	5,646	6,027	83	147,054	....	31,688	31,720	176,364	14,187	17,589	51,518	83,294	222,218	305,512	323,358	−6
S. D.	8,837	2,366	980	119,634	4,907	17,525	9,798	127,898	5,901	9,319	47,914	63,134	164,047	227,181	218,784	+4
Neb	24,811	38,311	26,777	138,108	24,789	253,310	66,366	190,558	94,990	78,722	88,606	263,771	571,019	834,790	767,546	+9
Kan	19,636	74,757	11,979	215,392	70,086	176,714	49,840	305,903	104,459	91,956	240,658	437,073	618,404	1,055,477	1,038,388	+2
Okla	58,626	31,653	22,800	284,133	151,644	247,565	162,815	448,477	155,106	125,026	223,753	504,374	958,747	1,463,121	1,374,428	+6
Tex	450,479	252,920	126,069	1,063,519	221,443	1,324,517	879,668	1,272,500	2,694,001	2,173,747	1,607,042	6,489,128	4,304,277	10,793,405	10,823,061	−0.3
Mont	10,891	5,934	67,479	316,818	15,810	59,012	18,341	324,053	37,426	22,980	29,010	89,416	494,285	583,701	569,937	+2
Wyo	5,087	6,119	3,314	200,143	15,401	32,621	74,722	278,511	47,262	16,669	83,051	146,982	337,407	484,389	401,553	+21
Colo	98,827	17,710	10,925	336,020	127 985	266 659	150,575	489,443	89,797	280,652	220,622	591,071	1,008,701	1,599,772	1,488,010	+14
N. M.	5,497	5,702	1,497	52,206	2,105	110,392	106,826	189,381	155,513	77,430	204,490	437,483	284,175	721,858	537,114	+34
1957	794,808	624,152	388,447	3,428,497	1,227,673	3,541,806	1,802,496	4,594,886	4,411,765	3,690,466	3,582,207	11,703,267	11,784,050	23,492,317	....	+3
1956	760,954	609,431	383,685	3,405,810	1,222,919	3,376,294	1,658,038	4,442,700	4,400,702	3,454,752	3,483,785	11,463,518	11,392,852	....	22,756,370	......
% Change	+4	+2	+1	+1	+0.4	+5	+9	+3	+0.3	+7	+3	+2	+3	+3	....	......
FAR WEST																
Idaho	4,057	11,511	6,951	112,994	31,023	62,896	28,704	156,648	21,010	17,236	551,610	589,856	258,136	847,992	867,033	−2
Utah	17,398	31,796	6,350	128,593	61,099	160,039	22,095	138,131	82,628	82,558	158,390	323,576	427,370	750,946	610,835	+23
Ariz	40,466	18,436	3,660	600,285	105,007	67,424	98,655	679,598	168,502	143,497	196,953	508,952	933,933	1,442,885	1,203,449	+20
Nev	8,918	2,287	4,374	37,198	....	37,984	20,333	33,773	18,602	72,481	44,790	135,873	111,094	246,967	247,325	−0.1
Wash	110,451	76,819	260,015	1,831,712	677,455	787,314	319,656	1,412,257	460,598	456,597	281,435	1,199,737	4,062,315	5,282,052	4,766,402	+10
Ore	5,054	22,070	152,517	219,777	33,246	106,387	26,078	265,462	250,649	81,703	303,812	636,164	444,971	1,081,135	979,896	+10
Calif	195,400	335,184	32,359	2,878,307	712,752	2,186,814	2,503,886	953,454	1,009,173	3,626,975	698,813	5,335,834	8,963,987	14,299,821	13,463,779	+7
1957	381,744	498,103	466,226	5,808,866	1,620,582	3,408,858	3,019,407	3,639,323	2,011,162	4,481,047	2,235,803	8,729,992	15,201,806	23,931,798	....	+8
1956	286,400	543,492	398,626	5,472,643	1,424,668	3,247,516	2,957,309	3,633,527	1,751,092	4,152,735	1,904,238	7,810,045	14,328,674	....	22,138,719	......
% Change	+33	−8	+17	+6	+14	+5	+2	+0.2	+15	+8	+17	+12	+6	+8	....	......
CANADA																
1957	208,392	288,143	226,461	768,451	1,256,653	2,203,881	1,471,859	920,051	2,534,719	2,213,930	2,265,497	7,016,470	6,421,516	13,437,986	....	+9
1956	197,754	293,831	235,270	807,829	1,302,145	1,665,166	1,421,422	863,496	2,628,440	2,072,927	1,717,521	6,420,462	5,921,843	....	12,342,305	......
% Change	+5	−2	−4	−5	−3	+32	+4	+7	−4	+7	+32	+9	+8	+9	....	......

FOR NORTHWEST DIGGING ABILITY

you need no greater proof!



1957 Saw 8 more NORTHWESTS in the fleet of Lambert Brothers Nashville, Tenn.

WHAT about shovel digging ability? What about shovel dependability? The experience of Lambert Brothers of Nashville, Tenn. is representative of Northwest owners all over the country. The business of Lambert Brothers is Rock and they know equipment. It is significant that Lambert Brothers has added eight more Northwests to their fleet in 1957. This makes some 30 Northwests that this well known Tennessee contractor has bought.

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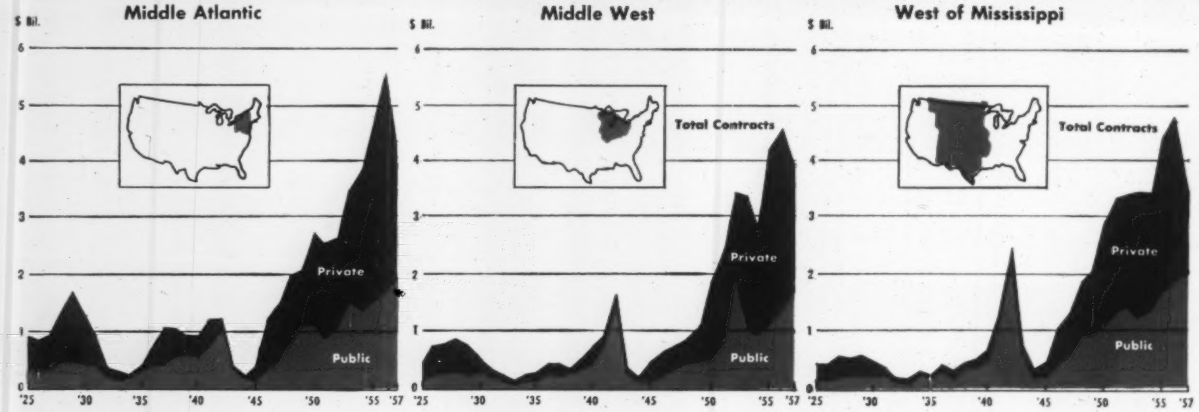
¾ Yd. to 2½ Yd. Capacity	13-Ton to 50-Ton Capacity	¾ Yd. to 3 Yd. Capacity	¾ Yd. to 2½ Yd. Capacity	25-Ton and 35-Ton Capacity

Middle Atlantic Region Again Leads in Volume . . .



Rising Public Contracts Offset Decline

The year 1957 marked a sharp shift in emphasis from a record volume of private construction in '56 to a record volume of public works in '57, according to ENR records. But every region except New England reported total contracts down from '56 because the sharp drops in their private construction offset the sizable increases in public projects.

• **New England**—New England ran counter to this national trend in three respects:

(1) it increased total construction activity by 7% over '56, setting a new record high of $1.2 billion.

(2) it stepped up private construction contracting by a whopping 35% to $639 million (also a record), when other regions were dropping behind '56 by 32% to 49%.

(3) it curtailed public projects contracting by 13% from its record '56 peak while other regions were stepping up such activity by 7% to 38%.

Last year, $235 million of new industrial plants went under contract, a record, and an impressive 30% increase over '56. Close behind, with $223 million, came private mass housing, up a staggering 59% from '56.

A steep slump in highway contracts (off 35%) and in bridges (down 46%) accounts for most of the over-all 13% dip in public works in New England last year. This reflects the big awards in '56 for Connecticut's turnpike which had no counter part in '57.

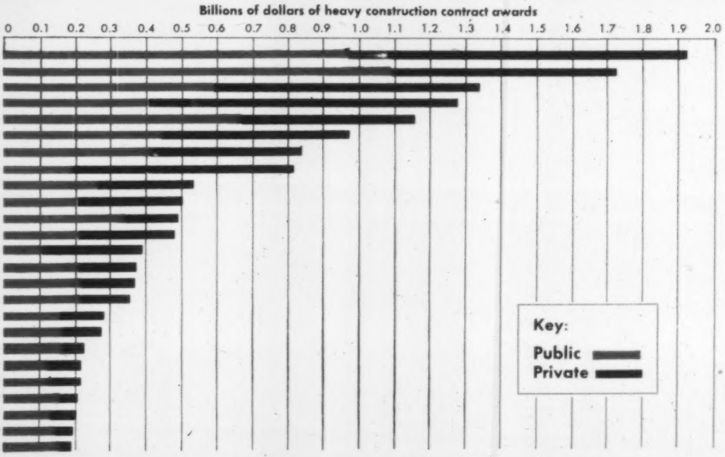
Public housing, on the other hand, zoomed to five times the '56 volume. Other public buildings awards jumped 22% over '56 to the second biggest dollar volume since 1951. Modest increases were scored in waterworks, and in earthworks, irrigation and drainage.

• **Middle Atlantic**—For the fourth consecutive year the Middle Atlantic region led all other regions in total dollar value of heavy construction contract awards. But a 22% decline from '56 brought the region's 1957 awards to $4.3 billion. Private work slid 38% to $2.4 billion, with housing dwindling 33% to $1.3 billion and industrial building plummeting 54% to $458 million. Commercial building dropped 32% below '56.

. . . as New York Outpaces California among States

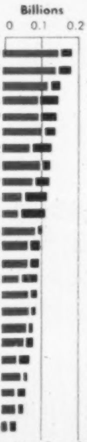
ENR Contract Awards—1957

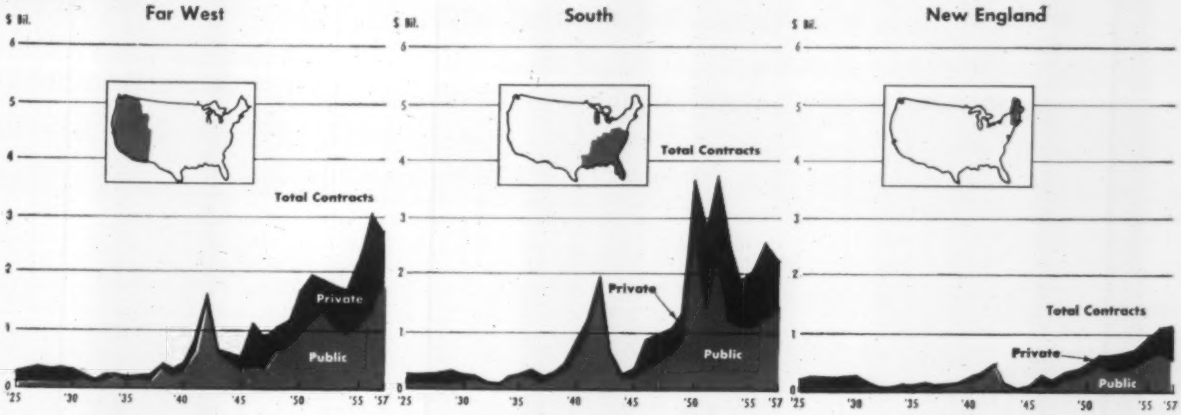
State	Amount (millions)	% Chg from '56
N. Y.	$1,922	— 12
Calif.	1,721	— 14
Texas	1,326	— 40
Ohio	1,276	— 1
Ill.	1,156	+ 7
Pa.	985	— 24
Mich.	827	— 27
N. J.	815	— 40
Fla.	529	+ 26
Conn.	499	+ 16
Wash.	482	— 11
Mass.	480	— 2
Ind.	398	— 54
Mo.	375	— 14
Md.	373	— 32
La.	354	+ 5
Minn.	278	+ 4
Wis.	275	+ 7
Iowa	224	+ 17
Ala.	222	— 33
Okla.	221	+ 7
Va.	206	— 49
Ky.	201	+ 1
Kan.	198	— 2
Colo.	195	— 58



ENR Contract Awards—1957

State	Amount (millions)	% Chg from '56
Ga.	$ 177	+100
Ore.	176	— 12
N. C.	144	— 4
Utah	140	+ 54
S. C.	139	+ 49
Tenn.	138	— 21
D. C.	125	+ 22
Ariz.	124	— 33
Neb.	123	— 19
Del.	120	+ 5
Ark.	109	— 30
N. Dak.	103	+ 24
N. Mex.	93	— 15
Nev.	90	+224
R. I.	83	+ 58
Miss.	82	+ 14
S. Dak.	81	+ 1
Wyo.	72	— 3
Mont.	72	— 36
W. Va.	66	— 77
Idaho	59	— 3
Maine	50	— 20
N. H.	49	— 2
Vt.	31	+ 42




Heavy Engineering Construction Contracts

in Private

A 14% increase in public works jobs in '57 lifted dollar volume to $1.9 billion, the highest on record. Road work jumped 42% to $531 million, the best since 1953, while $194 million of bridges scored a 115% increase over '56, setting a new record. Public buildings (other than housing) also set a record for the region in '57.

Records were also set for waterworks and for public housing. Sewerage jobs were the third best on record, while the two year drop in earthwork and drainage projects reflects the winding up of the St. Lawrence Seaway project.

• **Middle West**—The Middle West ranked second to the Middle Atlantic region in 1957 construction contracts, though its total slipped to $3.9 billion, a 15% drop from '56. Private awards of $2.2 billion slid 32% below the record year '56, while public work projects rose 24% to $1.7 billion, the second best on record.

Industrial building dropped 35% below the preceding year, while mass housing slumped 42% to $694 million, the lowest volume since 1952.

In contrast, public projects were brisk. With a big assist from some $250 million in Illinois toll road lettings, highway awards set a record, up 51% to $688 million, while bridge contracts soared 59% to $202 million, also a new high. Sewerage awards, too, joined the record pace setters with $176 million of awards, a sharp 30% gain over '56. The region's record $84-million of waterworks contracts were a 26% gain over '56. Public residential building, buildings other than housing, and unclassified public work slipped moderately under the previous year.

• **West of Mississippi**—This region slipped from second to third place in 1957 when contracts were cut a drastic 27%. However, with $3.5 billion, the region scored the third best year on record.

Private construction awards were cut back by 49% to $1.5 billion, the lowest volume since 1949. Mass housing accounted for much of this retrenchment, with awards slumping to $316 million, off 74% from '56 to the low of the '50's. Industrial building shrank to $597 million, a 36% drop from '56.

Public awards rose only 7% to $2.0 billion. Still this was the second best year on record, second only to the $2.4 billion of '42. Every type of public work except waterworks and unclassified projects bettered the previous year's dollar volume. Roads increased 6% to $713 million but set a new record for the region.

• **Far West**—The Far West dipped only 10% below its record 1956 level to $2.8 billion last year. It rang up a 38% increase in public works (best gain of any region), which helped offset a severe 47% decline in private construction. Public awards were a record $1.9 billion.

Private awards dropped below the record dollar volume of '57 to $909 million. Residential building shrank to less than half of 1956's $244 million and industrial building plummeted 56% to $307 million.

Earthwork and drainage contracts zoomed 79% above '56 to $497 million, a record peak. Ranking close behind were the $479 million of building (other than housing) contracts, which jumped 33% above '56. Road contracts of $368 million also set a record, 12% above the preceding year.

• **South**—Two-thirds of this region's construction awards in '57 were public projects. The 18% increase to $1.5 billion offset in part the 40% slump in private awards to $776 million. The over-all total of $2.3 billion slipped only 12% below '56.

Florida attracted the largest volume of industrial building in '57, but the sharp drop in the Virginias and Louisiana lowered the boom on the region's total to $429 million, 52% below the preceding year. Sharp gains in residential contracts in Florida and Louisiana offset declines in most other southern states, holding the region to $219 million or within 9% of '56.

Most public funds flowed into highway work in '57 in the South, and dollar volume rose 28% to $500 million, a record. Capehart housing swelled public housing awards to $216 million, a whopping 396% gain over '56. Other public building shot up 21% to $331 million, but this is far below the highs of the early 1950s.

Five Rate Over $1 Billion

New York regained the No. 1 position that it temporarily lost during World War II after 16 consecutive years (1925-40) of undisputed leadership in heavy construction.

But other states are beginning to crowd the front ranks of major construction states. In 1957, for example, five states rated over $1 billion of heavy engineering construction contracts, cornering 41% of the U.S. total of $17,986 million. In the late 'Twenties and all through the 'Thirties, no state came within striking distance of the Empire state.

The war brought a shift in population, industry, and public works to the South and West, a trend that bears watching as the next construction boom develops over the next decade.

. . . Postwar Building Boom in Key States

Mass housing, industrial and commercial buildings spur postwar construction boom in eight leading states

When the pentup demand for housing, industrial and commercial construction was unshackled from government restrictions at the end of World War II, the backlog of work burst forth with a roar. The direction and intensity of this boom are illustrated by the top eight construction states of 1957.

New York, California, Texas and Ohio accounted for over $6.2 billion of the country's $18 billion total awards.

The next four states—Illinois, Pennsylvania, Michigan, and New Jersey—contributed $3.8 billion of the 1957 construction awards. The story of these states is charted below and on page 63.

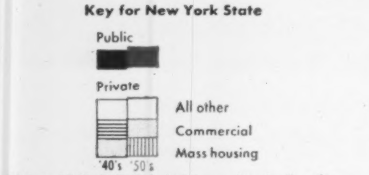
• **New York**—New York reached a postwar peak of over $2.3 billion in 1955. Over $1 billion of this record volume was private mass housing.

Meanwhile commercial construction reached a peak of $492 million in 1956.

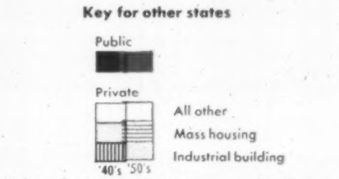
But in 1957, public construction took the lead in New York for the first time since 1949.

• **California**—Three times in the present decade California housing construction

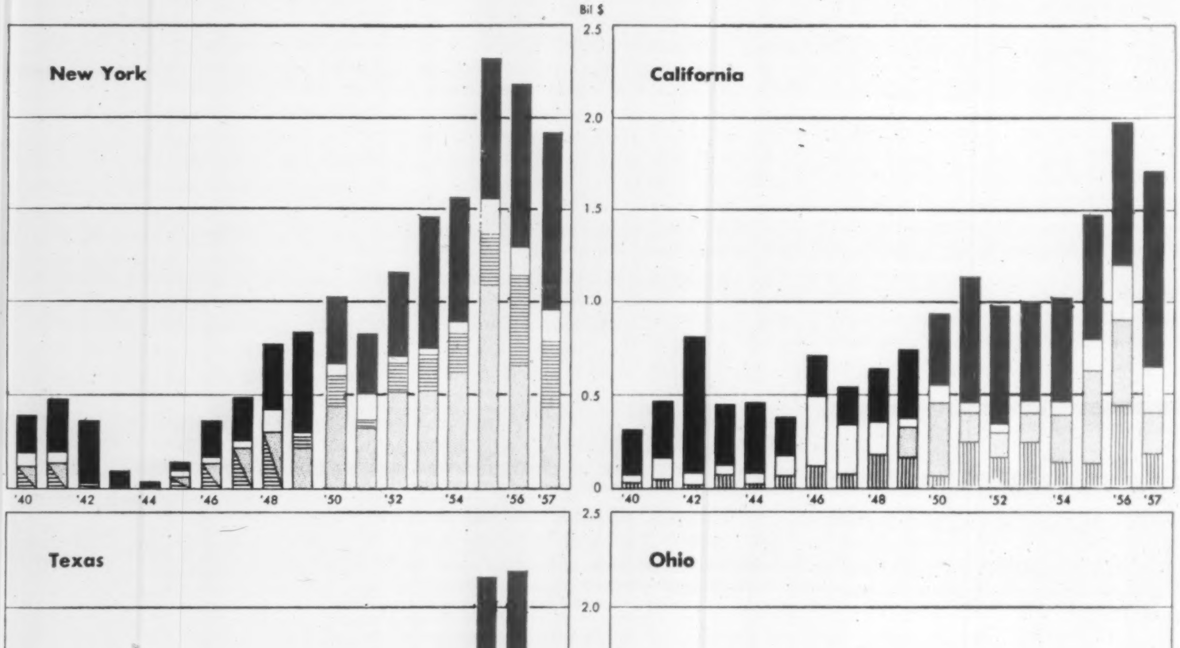
(Continued on page 63)


Key for New York State
Public
Private
All other
Commercial
Mass housing
'40's
'50's

Prior to 1949, ENR included "mass housing" under "commercial." No separate figures available, 1940-'48.


Key for other states
Public
Private
All other
Mass housing
Industrial building
'40's
'50's

In these charts, "mass housing" is part of "All other" from 1940-'48. See Key for New York State.



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State by State Contracts Reveal Shifts in

THE LATE TWENTIES marked a Golden Era of construction. Roaring ahead with big increases from year to year, the climax of nearly $4 billion was reached in 1929, more than 54% above 1925. But the upsurge wasn't uniform. New York nearly doubled its volume. Texas peaked out in '27, then receded. Virginia quadrupled its construction activity, while Massachusetts seesawed.

THE DECLINE in construction activity to the 1933 low of only $1 billion was rapid. The Middle Atlantic region shriveled to only 18% of its pre-depression peak. The Middle West did about the same. But in the Far West, the turn was beginning California stepped up construction volume by 34% from '32 to '33.

In '34 the gears were reversed. Construction picked up a momentum that did not falter until 1943, when World War II put a damper on all but the most essential building activity. Five of the six regions receded in the short-lived readjustment period of 1937. But the 36% bulge in the Middle Atlantic region that year more than offset the temporary lull in construction elsewhere.

Era of Roaring Twenties

Depression of the Thirties

Thousands of Dollars (000 omitted)

	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941
UNITED STATES	2,559,443	2,853,847	3,253,766	3,578,580	3,950,315	3,173,259	2,432,314	1,219,303	1,088,363	1,360,595	1,530,151	2,383,845	2,437,623	2,791,931	3,002,855	3,987,243	5,868,699
NEW ENGLAND																	
Me	6,264	12,304	8,561	8,550	14,909	12,139	10,587	7,664	4,833	4,003	7,676	8,598	8,478	7,412	6,320	14,820	40,134
N. H.	5,195	5,527	6,117	5,423	7,175	6,014	7,514	2,796	4,552	5,454	2,728	5,728	5,100	6,978	11,000	8,714	22,163
Vt.	2,329	5,522	5,023	7,613	5,410	4,170	3,565	2,882	1,939	6,732	6,070	3,935	4,211	3,205	4,305	4,647	4,369
Mass.	132,145	148,761	140,218	132,697	147,156	179,136	123,221	41,652	29,016	54,642	56,384	74,234	44,855	65,485	73,374	98,735	97,520
R. I.	18,314	19,446	23,812	15,765	13,676	15,440	9,440	3,579	5,180	8,371	7,379	14,320	8,107	10,917	13,710	40,723	31,548
Conn.	35,123	55,035	50,543	52,189	49,612	48,355	31,289	13,063	13,074	21,230	21,394	41,479	41,243	54,927	66,270	76,339	115,975
Total	**199,370**	**246,595**	**234,274**	**222,237**	**237,938**	**265,254**	**185,616**	**71,636**	**58,534**	**100,432**	**101,631**	**148,295**	**111,994**	**148,925**	**174,979**	**243,978**	**311,709**
MIDDLE ATLANTIC																	
N. Y.	559,946	445,355	551,686	839,302	1,094,109	836,181	632,154	179,125	161,872	157,667	305,725	515,233	615,147	695,199	521,663	392,834	480,801
N. J.	54,817	83,126	183,632	245,646	208,638	131,685	153,830	66,526	70,427	30,687	35,435	78,035	112,304	140,257	170,291	175,927	218,956
Pa.	275,620	229,839	211,066	219,603	285,272	255,375	112,116	77,603	47,754	44,688	49,000	121,294	265,855	161,008	182,317	279,971	359,548
Md.	42,504	95,395	40,019	75,096	86,552	59,529	65,285	19,440	9,794	24,593	25,527	29,490	29,527	30,824	35,471	62,030	93,174
D. C.	(a)	(a)	(a)	(a)	(a)	(a)	(a)	56,877	4,961	13,926	27,655	27,597	26,655	19,953	56,064	33,331	47,216
Del.	2,329	2,612	2,591	3,464	5,931	2,478	5,593	4,259	3,673	1,995	2,598	4,119	8,856	5,918	11,596	7,376	11,666
Total	**935,216**	**856,327**	**988,994**	**1,383,111**	**1,680,502**	**1,288,248**	**968,978**	**403,830**	**298,481**	**273,556**	**441,940**	**775,769**	**1,058,364**	**1,053,159**	**978,402**	**951,499**	**1,211,361**
SOUTH																	
Va	8,833	7,741	24,794	23,981	35,493	27,417	14,791	10,528	17,778	16,629	19,321	31,524	21,440	34,458	33,916	167,675	135,103
W. Va	18,048	9,938	17,089	16,690	23,997	29,259	13,238	8,453	5,569	13,703	16,775	14,615	7,850	14,094	27,123	30,538	39,912
N. C.	41,817	52,468	19,643	41,145	16,643	12,368	11,500	7,142	12,093	15,293	16,856	25,988	25,438	41,552	67,431	64,849	139,634
S. C.	5,787	3,166	7,457	10,233	5,758	19,209	12,486	3,656	1,814	6,997	8,527	25,809	21,010	19,854	40,907	46,332	59,125
Ga	11,934	13,419	17,076	38,597	54,343	20,501	17,455	10,469	11,419	14,026	26,914	38,762	18,877	28,727	41,679	69,551	124,764
Fla.	59,742	71,902	31,999	14,268	14,497	10,322	8,652	13,905	13,186	8,813	16,420	21,500	30,498	24,621	58,719	148,834	101,496
Ala.	23,600	29,807	27,295	30,834	34,209	11,281	8,452	7,459	5,505	36,839	41,849	24,980	14,449	18,492	35,940	68,502	190,950
Miss.	15,795	21,574	18,557	18,291	12,536	16,442	11,439	13,978	9,351	15,717	9,391	31,913	23,714	23,898	34,691	44,113	74,572
La.	25,807	31,650	27,086	26,052	77,287	42,912	85,075	21,438	20,355	21,026	29,322	15,998	37,196	29,432	40,855	53,390	143,775
Ky.	14,377	20,029	27,819	29,258	23,244	46,148	31,151	16,563	16,175	15,155	18,590	19,753	22,651	30,887	40,335	39,070	98,424
Tenn.	22,226	27,197	71,650	41,176	31,977	34,358	19,961	14,224	10,743	50,602	41,338	57,893	19,216	34,374	31,646	120,450	137,520
Total	**247,966**	**288,891**	**290,465**	**290,525**	**329,984**	**270,217**	**234,200**	**127,815**	**123,988**	**214,803**	**245,303**	**308,735**	**242,373**	**300,339**	**454,255**	**853,251**	**1,245,275**
MIDDLE WEST																	
Ohio	154,140	164,734	142,753	165,307	195,889	158,858	82,730	48,730	39,795	46,411	74,766	114,724	130,387	119,535	167,475	217,526	245,078
Ind.	21,431	52,318	68,204	62,208	75,758	87,094	63,015	23,365	34,530	33,087	33,684	38,056	33,007	47,770	75,352	145,359	195,720
Ill.	177,532	324,166	313,564	389,669	304,321	168,170	144,734	77,544	42,350	73,017	82,791	166,801	124,830	128,583	190,438	210,304	231,759
Wis.	51,783	64,889	47,639	54,466	59,747	51,812	41,652	26,919	19,597	29,590	34,653	48,655	41,616	38,800	48,134	49,233	103,123
Mich.	69,326	118,321	203,795	137,813	111,317	67,799	47,820	28,865	14,411	44,466	54,600	54,898	92,883	47,603	55,027	119,510	125,950
Total	**474,212**	**724,428**	**775,955**	**809,463**	**747,032**	**533,733**	**379,951**	**205,423**	**150,633**	**228,571**	**280,494**	**423,135**	**422,723**	**382,232**	**538,428**	**742,942**	**908,630**
WEST OF THE MISSISSIPPI																	
Minn.	34,760	31,420	37,896	29,117	34,482	51,931	28,133	21,892	16,304	14,051	23,550	45,421	31,746	29,925	50,520	33,816	73,875
Iowa	22,739	35,631	49,506	50,386	50,298	42,121	32,647	27,013	12,768	25,716	32,283	36,502	33,987	49,578	57,205	55,214	74,672
Mo.	138,463	100,366	136,811	133,682	209,888	101,788	68,818	51,582	57,752	59,537	53,735	64,518	67,550	74,094	61,878	103,192	189,748
Ark.	12,213	17,601	34,591	30,527	32,567	21,007	17,346	10,834	7,099	11,220	11,310	18,001	6,102	13,222	16,343	24,211	103,983
N. D.	2,920	3,688	3,578	4,164	3,230	3,048	1,751	4,247	2,274	4,731	4,720	12,037	6,004	8,191	9,841	9,126	6,690
S. D.	4,183	4,815	6,594	6,472	3,328	4,262	4,324	1,518	1,748	6,641	4,027	7,737	5,345	6,759	9,788	7,035	9,934
Neb.	29,519	16,117	14,808	19,208	14,553	13,736	16,475	11,345	10,727	16,604	21,752	33,974	28,576	38,007	42,683	32,133	28,121
Kan.	23,323	21,892	20,674	22,420	25,393	40,542	27,854	18,488	15,761	8,616	15,791	33,909	14,584	35,441	22,926	33,985	73,138
Okla.	35,177	28,507	40,050	41,234	45,578	39,828	32,334	14,673	15,307	14,475	19,013	18,994	20,454	63,944	42,788	35,422	111,892
Tex.	91,939	143,593	222,053	172,661	126,193	145,645	122,736	43,472	61,074	54,919	58,903	96,258	84,725	121,143	168,205	292,642	585,912
Mont.	1,177	2,694	5,175	7,720	7,629	3,765	23,975	8,025	5,255	69,808	17,935	22,015	16,390	12,857	19,221	19,293	12,331
Wyo.	1,570	925	2,007	2,892	11,058	5,761	6,737	5,900	4,723	6,979	14,205	7,830	6,231	11,727	12,337	8,980	14,569
Colo.	8,616	7,019	13,049	14,082	17,219	13,637	10,285	11,772	8,156	10,410	13,754	29,328	23,852	22,844	25,349	35,355	36,172
N. M.	959	694	6,625	3,168	2,071	2,943	2,837	5,544	6,347	6,618	4,137	18,454	12,872	9,620	9,527	11,639	18,230
Total	**407,558**	**414,962**	**593,417**	**537,733**	**583,487**	**490,014**	**396,252**	**236,205**	**225,295**	**310,325**	**295,136**	**444,978**	**358,418**	**497,352**	**548,612**	**702,222**	**1,345,177**
FAR WEST																	
Idaho	6,056	4,748	1,953	3,097	3,097	8,062	7,747	3,646	1,489	2,762	4,209	6,954	10,789	7,829	6,072	7,168	23,381
Utah	405	507	2,556	779	13,333	6,981	10,001	6,070	5,543	7,327	9,585	17,789	88,162	17,616	13,930	18,973	74,596
Ariz.	2,207	5,791	3,555	7,149	3,207	9,131	37,953	10,217	15,333	16,012	13,144	14,621	16,918	16,250	13,201	26,030	37,182
Nev.	1,518	2,421	1,605	1,766	4,465	3,898	31,831	10,378	8,485	11,313	12,262	7,154	8,986	5,522	6,351	6,801	31,229
Wash.	40,175	32,012	30,540	50,523	40,592	48,873	31,188	14,808	12,465	50,743	32,229	41,959	39,398	139,909	77,251	95,811	141,985
Ore.	14,996	10,868	18,314	15,508	11,108	30,778	13,913	12,234	11,049	28,225	18,461	15,894	11,470	37,444	27,695	30,202	65,003
Calif.	229,764	266,297	312,138	256,689	295,570	218,070	134,684	117,047	156,954	118,527	135,757	181,562	147,994	185,234	165,681	308,303	473,171
Total	**235,121**	**322,644**	**370,631**	**335,511**	**371,372**	**325,793**	**287,317**	**174,403**	**211,318**	**234,909**	**225,647**	**285,933**	**243,745**	**409,804**	**310,181**	**493,348**	**846,547**

(a) Included with Maryland

Heavy Construction over Four Eras, 1925-1957

THE WAR dealt construction a worse blow in some areas than the depression of the Thirties. In New England and the Middle Atlantic regions, new lows were set. Private construction virtually disappeared in New York state in 1944. In contrast, defense preparation brought a boom to the West of Mississippi region, which lifted Texas into the billion dollar class in 1942.

AFTER WORLD WAR II no time was lost in putting construction back on tracks. Contracts in 1946 were more than double those of 1945. By 1952, contract volume had doubled again. Eastern regions made a quick comeback. Atomic power plants rose in the South and Middle West.

The 1953-54 recession put a temporary dent in the construction boom. But the setback of 6% from 1952 to 1954 was soon forgotten when 1955 zoomed to a new peak of $18.7 billion, a whopping 30% jump over the preceding year. Industrial building and private housing sparked the rise that carried over to 1956 and a new all-time record of $21.7 billion. And though 1957 retreated to $18 billion, 20 states bettered their previous year's contracts.

Thousands of Dollars (000 omitted)

	World War II				Post World War II Era											
	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
UNITED STATES	9,305,829	3,061,844	1,729,753	2,283,408	5,176,034	5,659,232	7,219,387	8,157,403	13,341,607	13,603,363	15,289,244	15,170,893	14,412,033	16,721,852	21,711,931	17,993,845
NEW ENGLAND																
Me	38,392	29,937	5,041	6,041	30,411	18,951	6,186	17,007	15,521	60,291	59,955	74,883	96,033	64,923	62,435	43,663
N. H.	11,233	3,428	2,264	4,896	9,960	3,926	19,627	6,563	10,454	8,251	18,210	74,362	50,418	41,749	49,931	43,087
Vt.	1,995	1,662	849	1,192	7,374	3,197	5,943	18,773	6,355	5,915	11,318	9,453	11,553	20,629	21,594	30,656
Mass.	114,804	47,263	19,447	46,343	137,388	50,737	130,868	200,980	253,341	357,698	338,194	288,745	340,900	521,249	489,899	479,874
R. I.	172,525	13,690	8,565	8,221	21,594	27,981	27,030	22,849	42,833	62,169	46,045	48,079	34,763	75,532	52,224	82,505
Conn.	128,027	48,164	15,091	32,305	85,781	99,220	133,244	125,009	168,654	129,611	149,845	139,430	200,245	202,572	432,151	499,497
Total	**466,976**	**144,144**	**51,257**	**98,998**	**292,508**	**204,012**	**322,838**	**331,181**	**497,178**	**623,935**	**623,577**	**634,961**	**733,878**	**926,654**	**1,108,234**	**1,181,283**
MIDDLE ATLANTIC																
N. Y.	358,032	88,307	34,756	140,433	369,302	493,810	773,435	839,550	1,025,149	826,252	1,165,377	1,451,152	1,537,745	2,321,713	2,185,310	1,921,941
N. J.	223,546	111,685	63,180	50,013	105,699	226,503	173,434	240,374	465,599	315,592	327,851	573,716	531,239	858,480	1,317,934	815,399
Pa.	412,873	85,062	91,915	158,817	580,291	677,979	683,314	649,777	902,673	1,028,976	689,391	886,681	1,191,034	1,050,528	1,295,837	985,115
Md.	177,276	92,565	53,904	52,072	104,772	66,303	233,314	203,591	238,449	257,144	283,133	333,429	335,559	450,495	550,183	372,649
D. C.	39,165	13,569	18,793	20,960	19,302	32,271	29,398	69,978	61,730	33,439	83,076	67,887	105,238	104,370	102,257	125,130
Del.	14,498	11,868	4,432	6,605	48,960	39,726	89,458	62,028	66,107	85,593	95,566	87,328	90,023	213,892	114,222	120,095
Total	**1,225,390**	**403,056**	**266,980**	**428,900**	**1,228,326**	**1,536,596**	**1,990,853**	**2,088,398**	**2,759,907**	**2,578,996**	**2,645,339**	**3,400,193**	**3,843,873**	**4,939,533**	**5,535,803**	**4,340,329**
SOUTH																
Va.	297,980	90,004	60,558	53,000	59,019	74,058	88,345	103,999	177,123	213,335	373,090	313,380	320,693	321,347	403,629	206,139
W. Va.	27,658	22,636	16,138	15,558	33,289	34,171	42,444	31,922	87,617	90,572	37,715	142,815	83,751	134,270	285,423	66,088
N. C.	174,930	54,972	19,732	42,174	68,766	80,795	73,818	143,001	253,376	193,350	248,054	185,903	124,365	134,983	149,961	143,858
S. C.	88,568	38,079	11,711	7,970	91,609	64,252	75,291	64,049	341,287	148,144	180,700	129,055	85,233	115,992	93,358	139,075
Ga.	150,244	62,982	20,913	26,380	144,112	124,286	119,499	111,565	152,342	282,212	319,895	301,926	223,377	184,772	88,418	176,857
Fla.	362,366	180,643	50,094	42,802	118,842	178,097	148,807	166,735	274,151	317,533	335,101	411,494	336,756	240,441	421,258	529,158
Ala.	188,699	52,827	19,964	34,025	121,005	63,144	107,478	93,481	143,331	212,021	177,843	186,392	113,724	199,703	332,829	222,149
Miss.	123,067	30,890	11,473	11,159	36,186	57,796	48,999	58,328	95,306	142,890	122,666	97,661	67,212	42,530	71,684	82,029
La.	141,560	47,631	37,778	32,273	48,928	134,204	152,464	144,043	277,017	394,419	355,654	272,649	203,611	233,547	336,285	354,311
Ky.	76,790	20,563	10,102	18,420	32,716	83,572	82,453	110,956	666,810	447,367	716,841	176,977	177,758	246,684	199,121	200,770
Tenn.	289,310	72,089	19,667	23,077	109,674	84,207	139,088	361,936	181,937	318,233	804,102	304,636	155,904	158,289	174,239	138,249
Total	**1,930,172**	**873,316**	**278,130**	**306,838**	**864,148**	**978,582**	**1,080,688**	**1,365,086**	**3,648,300**	**2,780,423**	**3,721,671**	**2,522,883**	**1,832,384**	**2,012,558**	**2,558,205**	**2,258,683**
MIDDLE WEST																
Ohio	353,395	142,612	55,216	167,499	180,992	179,696	294,003	346,836	594,004	502,167	1,491,782	1,217,101	722,539	1,133,518	1,288,957	1,276,409
Ind.	334,688	81,214	32,395	45,479	65,769	85,630	99,414	85,485	211,665	343,835	220,744	538,055	402,084	444,891	864,274	398,111
Ill.	523,514	70,846	56,970	119,850	202,552	279,389	246,544	384,054	624,727	797,971	632,610	802,128	777,098	1,391,758	1,083,194	1,155,958
Wis.	104,862	18,934	35,101	41,042	62,428	119,145	131,759	135,689	162,461	130,400	167,980	162,472	226,657	251,142	256,110	274,982
Mich.	271,463	58,324	28,598	55,230	121,084	94,771	87,829	94,105	251,922	607,214	524,510	672,626	666,179	966,518	1,132,357	827,240
Total	**1,587,922**	**371,930**	**208,280**	**429,100**	**632,825**	**758,631**	**859,549**	**1,048,169**	**1,844,782**	**2,381,588**	**3,0[illegible]7,626**	**3,392,382**	**2,794,557**	**4,187,827**	**4,824,892**	**3,932,700**
WEST OF MISSISSIPPI																
Minn.	21,625	19,876	15,080	29,845	57,940	69,641	76,497	117,873	169,758	254,326	120,430	503,542	221,437	293,236	267,031	277,800
Iowa	73,311	18,856	12,523	16,615	76,004	56,169	85,226	110,769	111,220	130,128	177,844	97,074	113,191	203,322	191,085	224,470
Mo.	184,048	28,587	21,631	50,220	124,155	138,593	129,706	137,187	334,382	336,401	326,298	356,639	406,522	475,720	434,638	375,401
Ark.	148,796	29,557	35,767	9,700	26,667	97,265	53,259	64,214	133,226	154,872	184,127	73,944	92,680	49,152	155,907	109,450
N. D.	4,913	2,598	3,822	7,280	11,790	33,482	49,360	82,685	63,661	58,102	44,172	102,394	41,841	62,093	82,459	102,503
S. D.	54,532	8,601	720	5,332	18,209	24,072	38,829	86,254	44,259	100,817	69,779	72,040	59,454	75,350	80,959	81,385
Neb	227,548	81,194	23,756	19,494	26,390	38,102	91,339	76,725	93,234	78,487	121,330	118,729	100,341	134,318	151,150	122,919
Kan	238,667	61,277	17,865	21,263	53,502	79,556	86,337	105,745	146,693	191,056	224,552	164,316	232,468	328,947	202,120	197,646
Okla.	220,897	60,595	21,687	29,712	64,315	75,672	116,769	95,548	164,907	127,961	218,200	167,674	173,361	139,256	206,489	220,638
Tex.	1,076,381	353,586	150,133	270,253	485,860	552,424	896,984	996,209	1,353,110	1,575,695	1,587,142	1,504,399	1,507,315	2,156,805	2,193,948	1,325,965
Mont.	23,452	10,116	7,866	7,931	19,813	42,682	100,046	58,518	45,886	43,300	91,084	58,622	40,040	151,853	113,473	72,060
Wyo.	21,717	10,730	5,888	4,356	22,653	38,909	31,200	21,481	47,542	31,713	42,025	30,665	59,582	40,097	74,448	72,121
Colo.	105,269	15,175	10,083	10,905	28,970	57,650	68,228	64,714	63,006	188,221	125,980	95,124	298,374	225,089	469,950	195,461
N. M.	65,774	29,694	11,099	15,600	22,095	31,097	49,970	79,821	120,454	79,430	72,902	94,021	88,330	60,210	108,829	92,749
Total	**2,466,930**	**730,442**	**337,920**	**498,506**	**1,041,383**	**1,336,314**	**1,873,750**	**2,097,743**	**2,891,338**	**3,350,503**	**3,405,885**	**3,439,183**	**3,434,936**	**4,335,448**	**4,732,484**	**3,470,571**
FAR WEST																
Idaho	63,145	20,750	10,296	8,225	20,068	30,442	37,468	33,413	71,830	73,704	109,689	62,863	68,114	107,915	61,116	53,416
Utah	125,273	[illegible]0,184	20,154	8,205	9,637	29,408	53,391	43,783	37,429	72,683	62,693	68,477	78,416	77,445	91,338	140,283
Ariz.	120,537	25,337	10,718	5,899	37,759	12,299	32,006	46,817	54,648	65,660	77,825	73,688	31,724	57,552	183,227	123,553
Nev.	69,859	16,578	6,478	16,752	13,618	12,986	15,137	20,333	9,538	69,415	27,233	29,983	32,625	33,703	27,803	90,078
Wash	312,003	146,737	54,102	64,864	157,996	146,023	200,732	166,766	451,564	324,059	470,947	371,955	297,828	295,218	541,676	482,038
Ore.	121,587	44,335	26,961	29,471	163,422	70,259	114,300	129,747	131,840	163,889	125,102	169,560	178,040	140,665	199,603	175,996
Calif.	816,035	455,035	458,477	393,650	714,336	544,681	638,617	747,988	943,253	1,142,486	981,617	1,004,759	1,025,653	1,487,353	1,989,571	1,720,919
Total	**1,628,439**	**738,956**	**587,186**	**527,066**	**1,116,8[illegible]**	**846,098**	**1,091,651**	**1,188,847**	**1,700,102**	**1,911,905**	**1,855,103**	**1,781,285**	**1,712,400**	**2,199,837**	**3,094,333**	**2,792,299**

look ahead with LEAD

Golden Gate Bridge, world's longest suspension span, and Oakland Bridge in background, beat the "eat" of corrosion with periodic maintenance coats of Red Lead.

RED LEAD Locks Out Rust from San Francisco Bay Area Bridges

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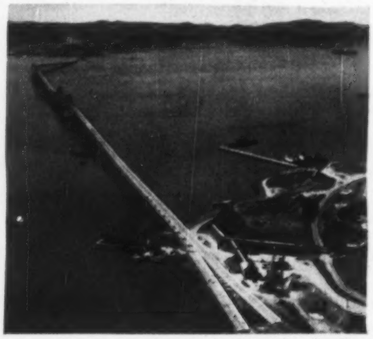


New Richmond-San Rafael Bridge in San Francisco Bay Area uses two coats of Red Lead for maximum protection.

Lead Industries Association

60 East 42nd Street New York 17, N. Y.

Postwar Building Boom in Key States . . .

(*Continued from page* 58)

contracts soared above the $400 million mark. The peak came in '55 with $490 million, with '56 not far behind. New plant construction reached a high of $448 million in '56.

Public works set a record in '57.

- **Texas**—Texas slipped to third place in '57. Mass housing, which hit a peak of $980 million in '55 dwindled to $222 million in '57. Industrial building dropped to $270 million.

- **Ohio**—Ohio has enjoyed two consecutive years of heavy industrial building. The peak of $470 million was set in '56, but last year's $451 million was not far behind. Housing reached its peak of $419 million in '55.

- **Illinois**—This state's building boom hit its peak in '55 largely as a result of a record volume of home building. Industrial building reached it's highest level in '51 with $336 million, but '56 ranked close behind with $321 million.

- **Pennsylvania**—For four out of the last eight years, the Keystone state has added more than $1 billion annually to contractors' books. Top year was '56 with $1.3 billion. Peak year for housing was '54 with $530 million; for industrial building, $502 million in '51.

Meanwhile public contracts are gaining momentum, with '57 setting a record with $442 million.

- **Michigan**—In 1956, Michigan joined the billion dollar construction states for the first time, chiefly under the impact of $544 million of mass housing contracts, a record. Its peak industrial building year occurred in '51.

- **New Jersey**—New Jersey also reached the billion dollar construction class in 1956 when it hit new highs for both mass housing and industrial building. Both dropped sharply in '57, but still were the third best on record.

Key for states

Public ■

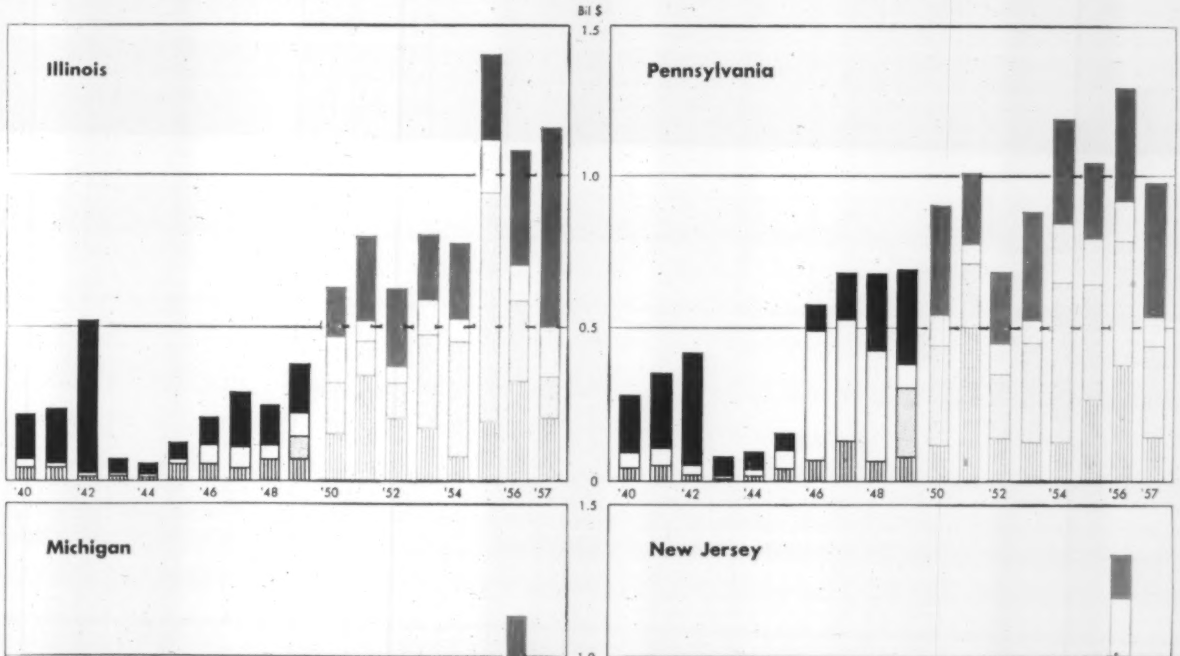
Private

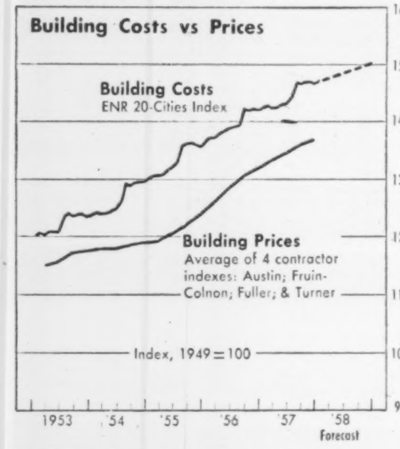
☐ All other

☐ Mass housing

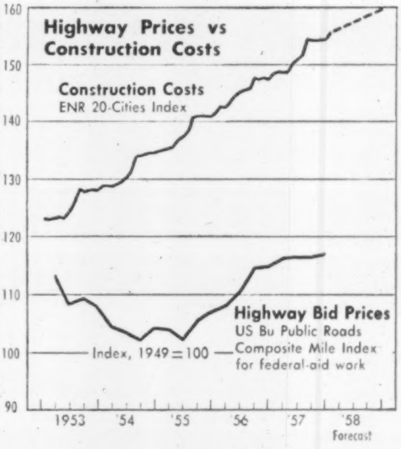
▥ Industrial building

In these charts, "mass housing" is part of "All other" from 1940-'48. See Key for New York State.

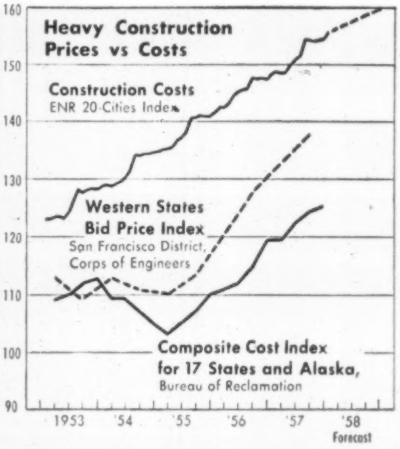




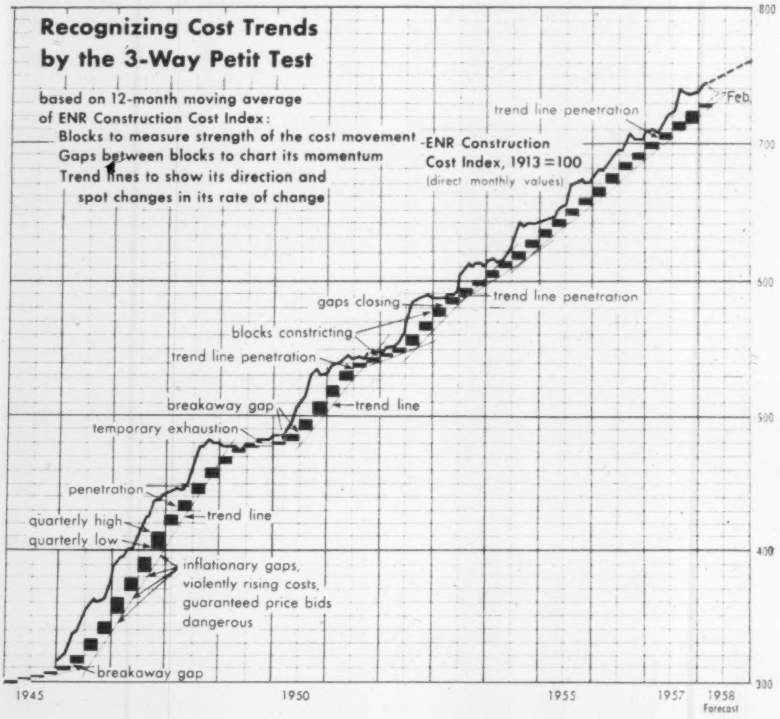
Building prices rise faster than basic materials and labor costs in 1957.



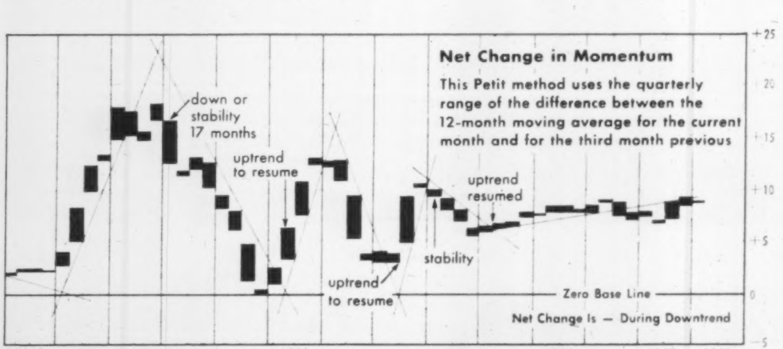
Highway contractors hold bid prices to a smaller rise than basic costs.



Heavy construction bids are up sharply in the western states.



Slowdown in the cost rise is flagged as the blocks penetrate the trend line in the second half of 1957 and first two months of 1958.



Lost momentum was regained in '57, but the cost rise is again losing momentum.

Cost and

The construction cost trend continued upward in 1957 and a further increase is coming in 1958. But this year will see a smaller rise than in 1957.

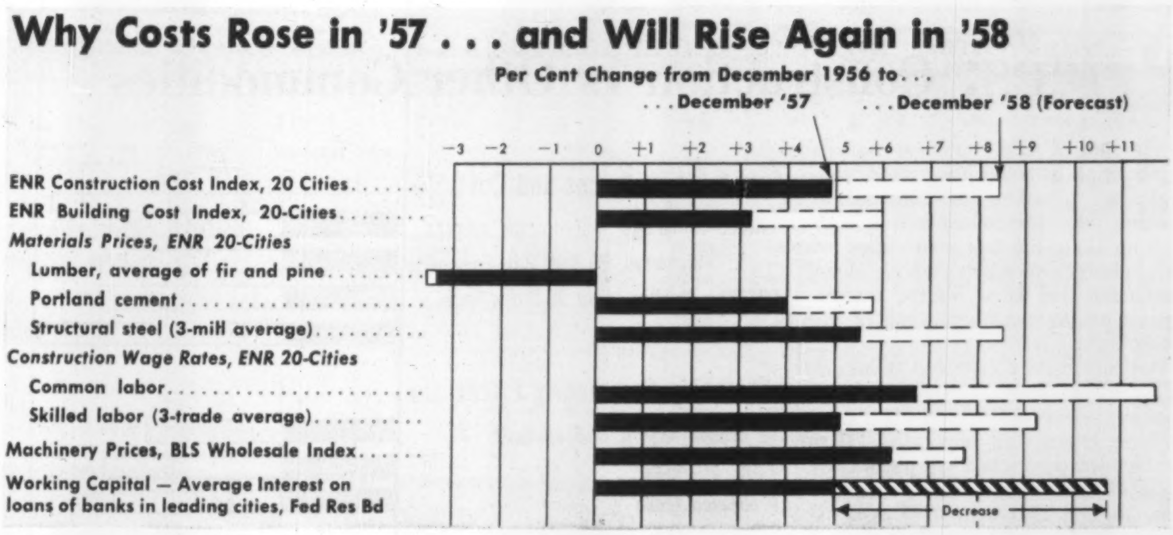
Though demand for construction materials and labor turned downward in '57, prices of many materials increased and wages climbed at a faster clip than they did the previous year. The mill price of structural steel shapes rose 5.5% and ENR's 20-cities averages moved up 4.0% for cement prices, 6.9% for common labor rates and 5.2% for skilled labor rates (average of bricklayers, carpenters and structural ironworkers). The only major construction material to fall in price last year was lumber. ENR's average for Douglas fir 2x4's declined 2.6% and Southern pine 2x4's slipped 3.0%.

The over-all effect of these changes was to push the ENR 20-Cities Construction Cost Index up 4.9% between December '56 and December '57 when it reached a value of 738.08, based on 1913 = 100. This rise was greater than the corresponding 1956 increase of 4.6% because of bigger wage raises for common labor.

The ENR Building Cost Index of 516.27 in December '57 (also based on 1913) was 3.2% higher than its December '56 value. This was less than its 4.5% rise in 1956. The Building Cost Index uses the same materials component as the Construction Cost Index but instead of common labor it uses the average rate for three skilled trades. Like common labor rates, skilled wages also moved up by greater amounts in '57 than '56 (see page 66).

Since December '57 the Construction Cost Index has moved still higher. The latest weekly value is 743.77 for February 6. This is 0.8% more than

Why Costs Rose in '57 . . . and Will Rise Again in '58



Price Spirals Lose Momentum

the December value and 4.9% higher than the corresponding week a year ago. By contrast, the Building Cost Index dipped 0.1% below December to 515.78 in the latest week. This is 2.8% higher than a year ago.

Pushing costs up so far in 1958 are scattered cement price advances and wage raises in a few cities. Offsetting these are declines in lumber prices.

• **Slower cost rise in '58**—More price and wage hikes are expected in the coming months. Many unions in the 20 U. S. cities covered by ENR's indexes will receive wage raises provided by existing contracts. And unions which will negotiate new contracts this year are expected to win increases also. However, the average raise in '58 will be less than in '57 (see page 66).

Prices of the key materials, cement and structural steel, are going to increase, though less than in '57. ENR forecasts its 20-cities average for bulk cement at $3.99 per bbl in December '58, up six cents over December '57. The mill base price of structural steel shapes should rise 15 cents per cwt to $5.425 at mid-year. These 1958 increases are about half as great as the price hikes which went into effect in '57. Lumber prices are expected to dip less than 1%.

Based on these estimates of price and wage changes, ENR forecasts a slowdown in the cost rise this year: The Construction Cost Index will reach 763 by next December, a 3.4% increase for the year; the Building Cost Index will be 530, up 2.7% over December '57.

Other elements of construction costs—machinery prices and working capital costs—will not add to the cost push in 1958, as they did in 1957. Construction machinery prices are forecast to hold close to their current level, which is 6% higher than a year ago and a whopping 24.7% more than three years ago. Any rise in '58 should hold within 1% to 2%, though contractors may actually pay less this year than last because of higher trade-in allowances.

Interest rates on bank loans should drop below their 1958 postwar highs and the balances required to remain in deposit will be lower which will further trim borrowing costs.

• **Contractors' prices up**—Contractors paid higher prices for materials, labor, machines and working capital loans in '57 so they raised their prices for new construction (see charts at top of opposite page).

Building contractors prices moved up 3.8% between the fourth quarter of '56 and the final quarter of '57, according to the average of four contractor indexes (Austin Company, Cleveland; Fruin-Colnon Contracting Co., St. Louis; George A. Fuller Co., New York; and Turner Construction Co., New York).

Bigger increases came in bids on heavy construction. The San Francisco District Corps of Engineers reports its contract Unit Price Index for projects in western states climbed 7.8% between the second half of '56 and the corresponding period of 1957. The Bureau of Reclamation's Composite Cost Index rose 4.8% between the fourth quarter of '56 and fourth quarter of '57.

Highway contractors upped their bid prices by 1.9% between the fourth quarter '56 and fourth quarter '57, according to the U.S. Bureau of Public Roads composite mile index for federal-aid work.

However, all of these construction price indexes actually rose at a slower rate in '57 than in '56 when booming contract awards, materials shortages, slow or indefinite deliveries, and uncertainty over future price increases contributed to a very rapid rise in contractors' selling prices.

The 1957 business picture contrasted sharply with that of 1956. Heavy construction contracts dropped 17% and the reduced demand for materials permitted suppliers to catch up with orders. Shortages disappeared and new orders could be delivered with little delay. Competition among contractors intensified as the total amount of new work available tapered off. As the months of 1957 rolled by this situation became more pronounced and the uptrend in contractor prices began to taper off.

Competition for highway work was particularly keen and this showed up in the BPR bid price index which steadied after the first quarter. The trend in the Bureau of Reclamation index tapered off in second half of '57.

Of the two building contractor price indexes available for January '58, the Turner index is unchanged from its July '57 and October '57 value. But the Fuller index was up 1.4% over its October value, about the same increase as in the same period a year ago.

Another rise in contractor prices is expected in 1958. But the slowdown in the rate of increase will continue because: Prices of basic materials and labor will move up less rapidly this year; machinery prices will be more stable; the costs of working capital will drop; and, perhaps most important, the volume of new heavy construction available in '58 is expected to be a little less than in '57.

Prices: Construction vs Other Commodities

The nearly steady postwar rise in construction costs and contractors' selling prices is making the construction industry more cost-conscious with each step up along the cost trail. Some of the industry's members, among them contractors and labor leaders, caution against pricing construction out of the market.

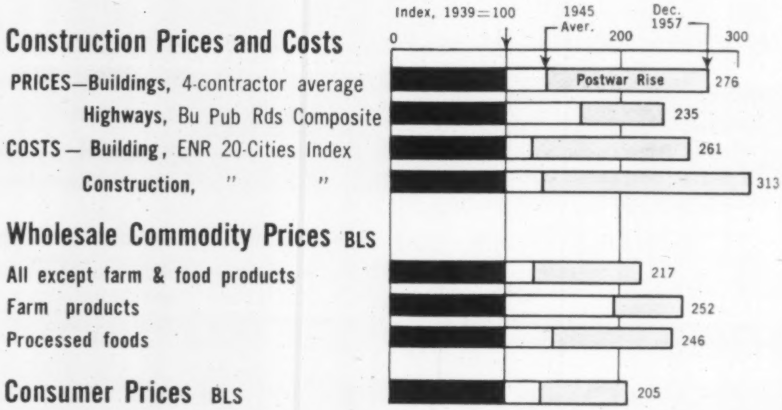
Are construction costs and prices out of line? The chart at the right shows increases since 1939 are 176% for building contractors' prices and 135% for highway contractors' bid prices. But costs of basic materials and labor are now 161% higher than 1939 as measured by ENR's Building Cost Index and up 213% according to ENR's Construction Cost Index.

This big rise in the Construction Cost Index is entirely due to the tremendous 243% gain in common labor wage rates during the last 28 years. Skilled wages rose 151%. Materials prices are up 172% since 1939, as measured by the ENR index for steel, lumber and cement—or 176% according to the more comprehensive Bureau of Labor Statistics price index. Construction machinery prices are up 152%.

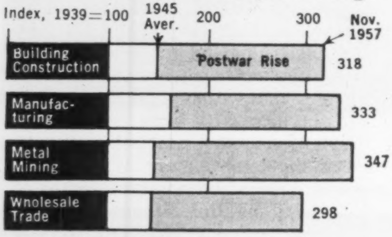
These are big increases but other commodities have risen sharply, too. Foods and farm products are up almost as much as building prices and more than highway prices.

Average hourly earnings on building construction are up less since 1939 than manufacturing workers' and metal mining workers' earnings.

Mechanization and cost-saving on-site construction methods have increased the construction workers productivity slowly but surely. That's why prices have increased no more than basic costs since 1939.

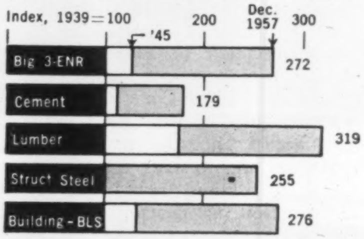


Labor—Average Hourly Earnings

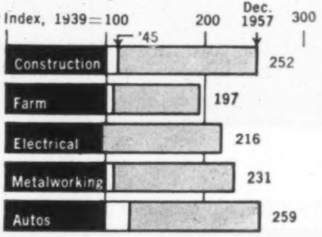


U.S. Bureau of Labor Statistics

Construction Materials Prices



Machinery Prices



U.S. Bureau of Labor Statistics

Wages Give Costs Biggest Lift in 1957

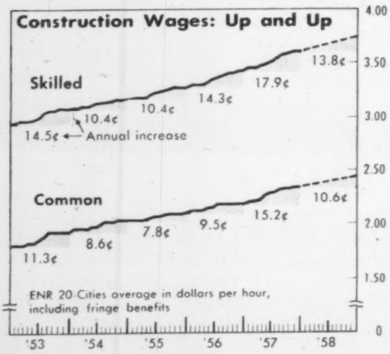
Construction workers won much larger increases in '57 than in '56 or in other recent years.

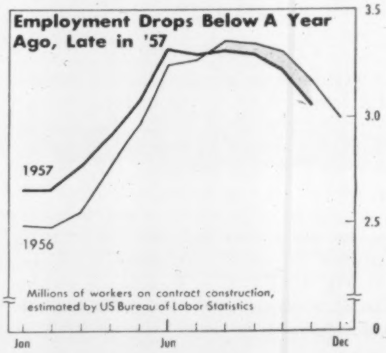
Common labor rates rose an average of 15.2 cents per hour compared with 9.5 cents in 1956 (see chart below). The ENR 20-cities average wage, including fringe benefits, set a new high of $2.344 per hour in December '57.

Skilled workers also came up with bigger wage hikes in '57 than in recent years. The average rate for bricklayers, carpenters and structural ironworkers trades rose 17.9 cents per hour in '57. December '57 average rates for the individual trades were: bricklayers $3.865; carpenters $3.341; and structural ironworkers $3.624.

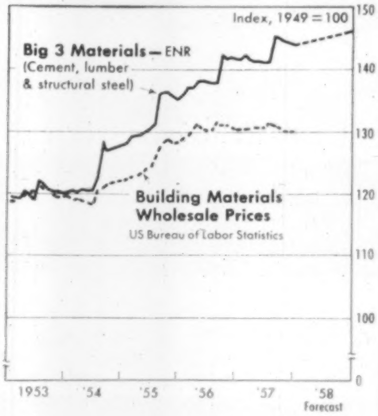
Construction machinery operators shared in the 1957 round of wage hikes. The 20-cities average of three types rose 10.7 cents to $3.248 per hour (tractor, power crane & shovel, and air compressor operators).

This year's negotiations will bring more but smaller wage hikes, which ENR forecasts at about 11 cents per hour for common labor and 14 cents for skilled. Existing contracts call for 1958 wage hikes for many unions in the ENR 20-cities.





Materials Prices Rise



. . . But Shipments Drop for Many Materials

Material	Source	Unit	1955	1956	1957	Percent Change 1956–57
Steel						
Fabricated structural bookings	AISC	thous tons	3,695.5	4,013.2	2,780.6	−31
Fabricated structural shipments	AISC	thous tons	2,982.3	3,205.5	3,652.0	+14
Reinforcing bars (net)	AISI	thous tons	2,164.6	2,517.8	2,311.4*	− 8
Cement, Portland						
Shipments	Bu Mines	mil bbls	292.7	308.8	289.0*	−6.0
Concrete pavement awards	PCA	mil sy	92.8	84.9	94.0	+11
Lumber						
Orders	NLMA	mil fbm	39,744.0	36,186.0	33,390.0*	− 8
Production	NLMA	mil fbm	39,105.0	37,528.0	33,390.0*	−11
Shipments	NLMA	mil fbm	39,605.0	36,443.0	33,560.0*	− 8
Plywood, Douglas fir						
Orders (3/8 in. basis)	DFPA	mil sf	4,817.0	4,996.0	5,290.0	+ 6
Production (3/8 in. basis)	DFPA	mil sf	4,900.2	5,172.8	5,395.5	+ 4
Clay construction products						
Brick, unglazed, common and face	Bureau	mil std brk	7,012.2	6,698.1	6,145.4*	− 8
Structural tile, unglazed	of	thous tons	834.5	674.1	586.1*	−13
Vitrified clay sewer pipe	Census	thous tons	1,874.4	1,857.7	1,658.0*	−11
Aluminum wrought products (net)						
Sheet & plate, non heat-treatable	Bureau	mil lbs	1,049.7	1,050.6	951.5*	− 9
Wire and cable	of	mil lbs	258.1	303.0	282.5*	− 7
Extruded shapes, soft alloy	Census	mil lbs	634.9	641.0	646.7*	+ 1
Asphalt products						
Roofing	Bu of	thous sqs	62,582.4	57,590.4	53,072.6*	− 8
Siding	Census	thous sqs	1,288.4	1,208.3	1,059.3*	−12

* Estimated

Construction materials prices moved up with few exceptions in 1957. Lumber stood out as the only major material to decline in price with only mineral wool insulation keeping company.

Leading the price increase parade in '57 was concrete sewer pipe with an 8% climb, according to ENR's 20-cities average.

Other increases having a range of from 4% to 6% were turned in by cement, structural clay tile, finishing lime and structural steel (base mill price) and Douglas fir plywood. Lesser increases came in ready-mixed concrete, sand, concrete blocks, brick, gravel, clay sewer pipe, and gypsum and fiber board sheeting.

Though the price trend was up, the demand for most materials was down (see table). Lower shipments reflected the decline in heavy construction contracts.

Bucking the shipments downtrend were structural steel and Douglas fir plywood.

Structural steel fabricators shipped a record amount of tonnage for a 14% gain over '57. But much of this represented the tremendous backlog of bookings on hand at the beginning of the year. New bookings in 1957 fell 31% below 1956 and in the fall of '57 many fabricators began to cut prices to get new business. In December prices of some firms were down 20% from the January '57 point and many reported that they had trimmed their prices at least 10%.

Moreover, contractors found that they no longer had to pay premium for scarce steel.

Machinery Prices Up, But Demand Turns Soft

Construction machinery prices were marked up with substantial increases for the third consecutive year in 1957. By December, they were 6% higher than a year earlier, according to the Bureau of Labor Statistics index of manufacturers' prices.

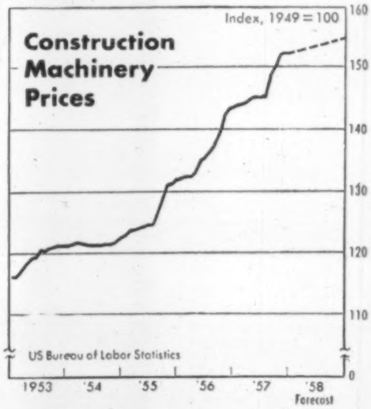
But shipments and new orders for construction machinery were lower than the record volume for 1956. Shipments of excavating and earthmoving machines held up until the third quarter when they started to trail off and continued to show a decline throughout the fourth quarter.

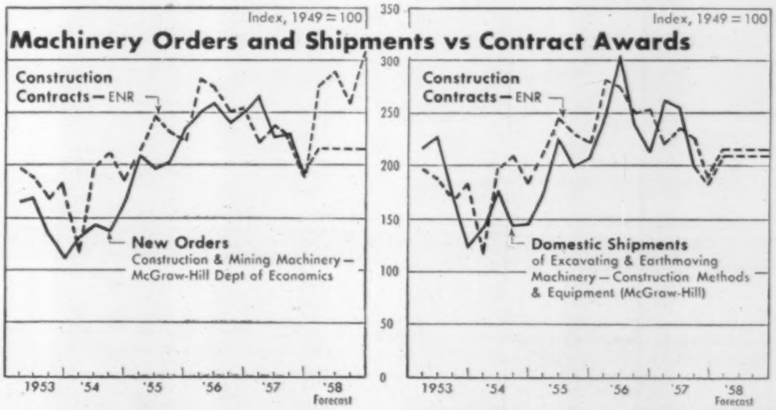
But new orders for construction and mining machinery started out the year with a very good first quarter, but sagged in the next nine months. For the full year '57, orders dropped 9% below 1956's record high, according to the McGraw-Hill Department of Economics index which averaged 229 per month (based on 1913 = 100).

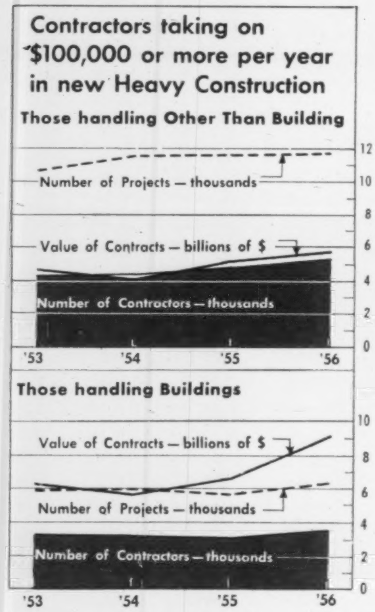
The low fourth quarter averaged only 192.

Machinery manufacturers expect a major reversal in '58 of this orders downturn. They predict orders will rise 24% above 1957. But this looks too optimistic. If heavy construction contracts hold to ENR's forecast of a 2% dip in '57, machinery orders are unlikely to show much of a gain.

The softness in the construction machinery market will mean more stable prices in 1958. An average price rise of 1% to 2% seems likely to be the topmost change.

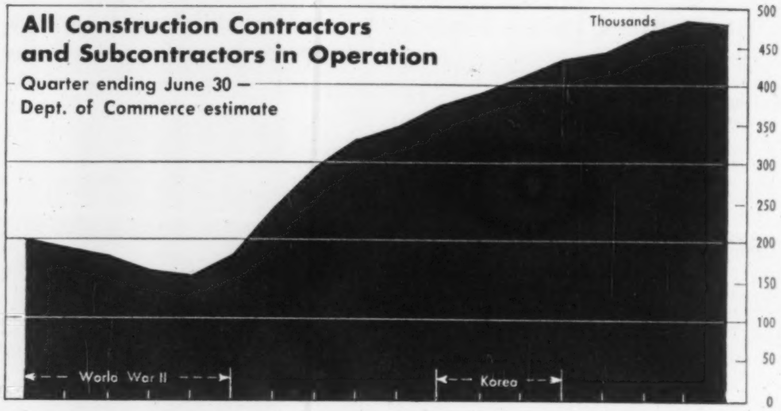




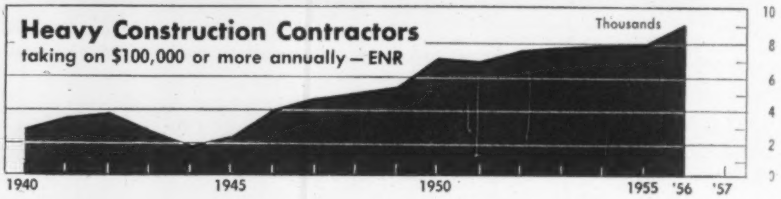

Contractors taking on $100,000 or more per year in new Heavy Construction

Those handling Other Than Building

Those handling Buildings


All Construction Contractors and Subcontractors in Operation

Quarter ending June 30 — Dept. of Commerce estimate


Heavy Construction Contractors taking on $100,000 or more annually — ENR

A Big Industry Gets Bigger

More than half a million firms are making construction a giant industry (by far the biggest fabricating industry in business). It has to be big to take on $67.6 billion in new business this year (see page 49).

Contractors and subcontractors make up most of the industry. Their number has mushroomed from a post World War II count of 176,800 in 1945 to 478,000 on June 30, 1957, according to the U. S. Department of Commerce. (See chart above.) This includes general contractors, building contractors, and special trade contractors handling painting, plumbing, electrical wiring, tile setting and other services needed on new construction, maintenance, and repair work.

Contractors taking on $100,000 or more in heavy construction contracts during 1956 numbered 8,941, according to contract awards reported by ENR. These firms took on 18,180 projects for a total dollar value of $14,743 million. (See ENR, June 6, 1957 for more details.) There were 2,896 heavy construction contractors with $1 million or more new 1956 business and the biggest firm had $247.5 million, according to ENR project reports.

In addition to contractors, there are thousands of architects, consulting engineers, and architect-engineer firms which put construction ideas on paper for the contractors. (See charts at left.) The number of these firms taking on $100,000 or more per year in heavy construction projects was 5,620 in 1956, according to ENR's reports on projects going onto the drawing boards that year. Of these 3,573 were architects, 1,666 were consulting engineers, and 381 were architect-engineers.

Together, these three groups took on 16,595 new projects in 1956 with an estimated cost of $24,806.1 million.

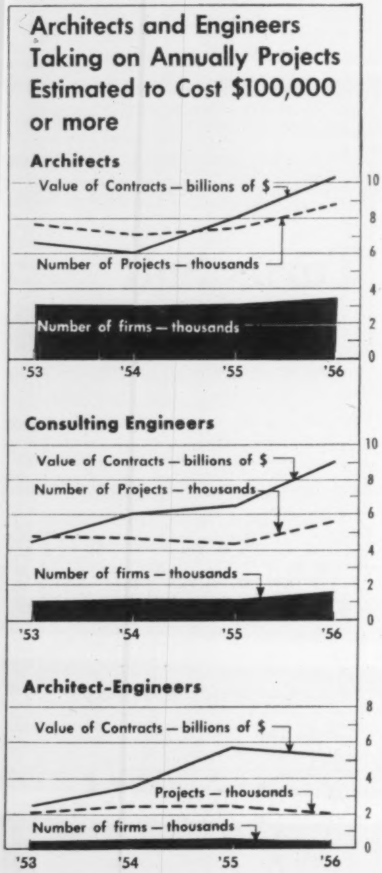
The 3,573 architects taking on $100,000 or more work in 1956 analyzed by ENR did a record volume of new business of $10.4 billion spread among 8,896 projects. This was an increase of 15% over 1955 in number of firms, 17% in number of projects handled, and 29% in the value of new work put on architectural drawing boards.

Consulting engineers also did a record volume of new business in 1956 of $9.1 billion, a thumping 40% increase over the preceding year, based on ENR's records of those scoring at least $100,000 in the year. This was spread among 5,672 new projects, up 31% over 1955.

Architect-engineers doing $100,000 or more business in 1956 slipped a sharp 23% to 381, with projects shrinking 2% to 2,027 valued at $5.4 billion.

In addition to actual planners and builders, the construction industry includes several thousand material and equipment dealers and distributors. Latest Census (1954) indicated there were 6,010 material distributors with sales of $2,780 million, 4,304 lumber and millwork dealers doing $3,806 million of business, and 1,640 construction and mining equipment dealers with sales of $1,401 million.

And finally, for the year 1957, workers on contract construction averaged a record 3,032,000 per month. It was the first time in the postwar period that the average topped 3 million.


Architects and Engineers Taking on Annually Projects Estimated to Cost $100,000 or more

Architects

Consulting Engineers

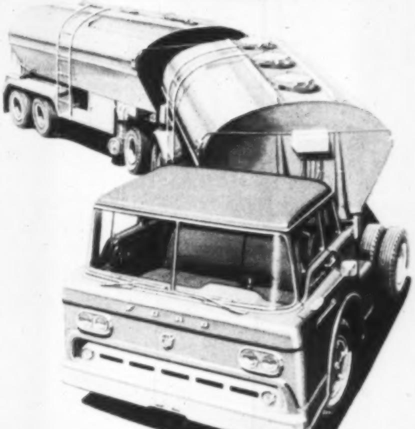
Architect-Engineers

THIS ANALYSIS of heavy construction contractors' new business is based on contract awards reported by ENR. The analysis of new business taken on by architects, consulting engineers and architect-engineers is based on proposed projects reported by ENR.

FORD

1958 EXTRA HEAVY DUTY TRUCKS

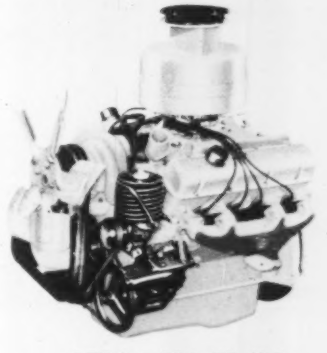
WITH NEW SUPER DUTY V-8'S



C-850
C-950
C-1000
C-1100

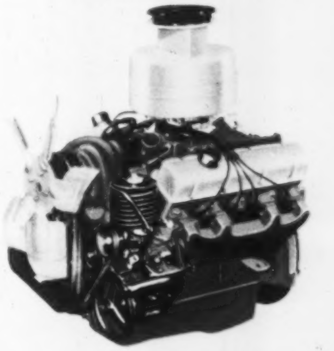
F-850
F-950
F-1000
F-1100

T-850
T-950



277-hp 534 SD V-8

260-hp 477 SD V-8



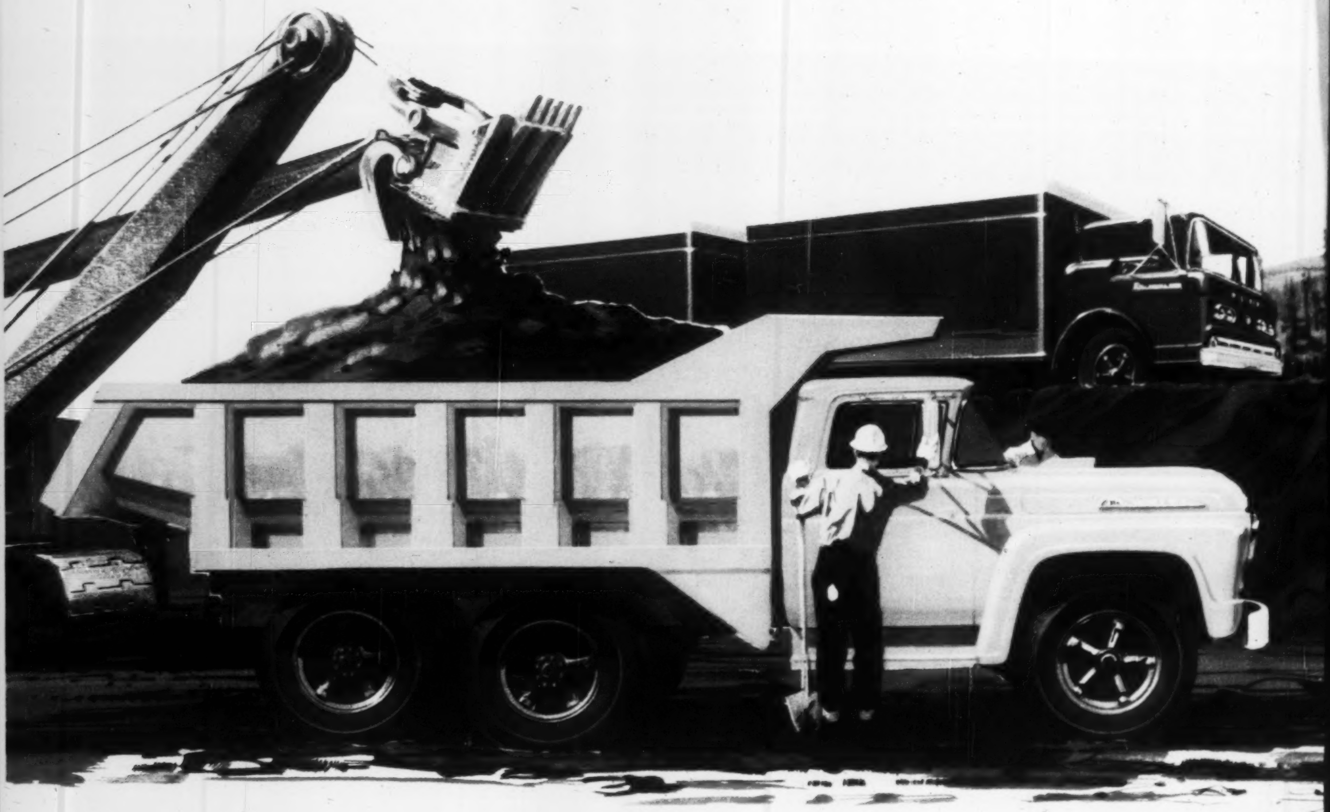
226-hp 401 SD V-8

BIG TRUCK BUILT...BIG TRUCK POWERED...AT FORD'S LOW PRICES!

FORD TRUCKS COST LESS

...LESS TO OWN ...LESS TO RUN ...LAST LONGER, TOO!

NEW FORD EXTRA HEAVIES



FORD T-950 tandem dump truck with up to 51,000-lb. GVW, up to 277-hp Super Duty V-8 available. GCW 75,000 lb.

FORD C-1000 Tilt Cab tractor with big 260-hp Super Duty V-8 engine. Maximum GCW 65,000 lb. with optional axle, GVW 31,000 lb.

FORD F-1100 conventional with 277-hp Super Duty V-8 standard. Maximum GVW 36,000 lb. with optional 29,000-lb. rear axle.

Step in . . . the new Ford Extra Heavy Duty trucks for '58—the all-new, more rugged line with huge payload capacities for on-highway or off-the-road service. *Step ahead* with Ford's more-for-your-money features. Meet America's most modern *big* trucks for '58. Discover the new advances in this pace-setting Extra Heavy Duty line of Conventionals, Tilt Cabs and Tandems.

They're new in power, too! Ford now offers three mighty new Super Duty V-8's. Extra rugged, modern big engines with up to 534-cubic inch displacement . . . up to 277 horsepower! And "over square" (bore larger than stroke) Short Stroke design provides maximum power, durability and economy.

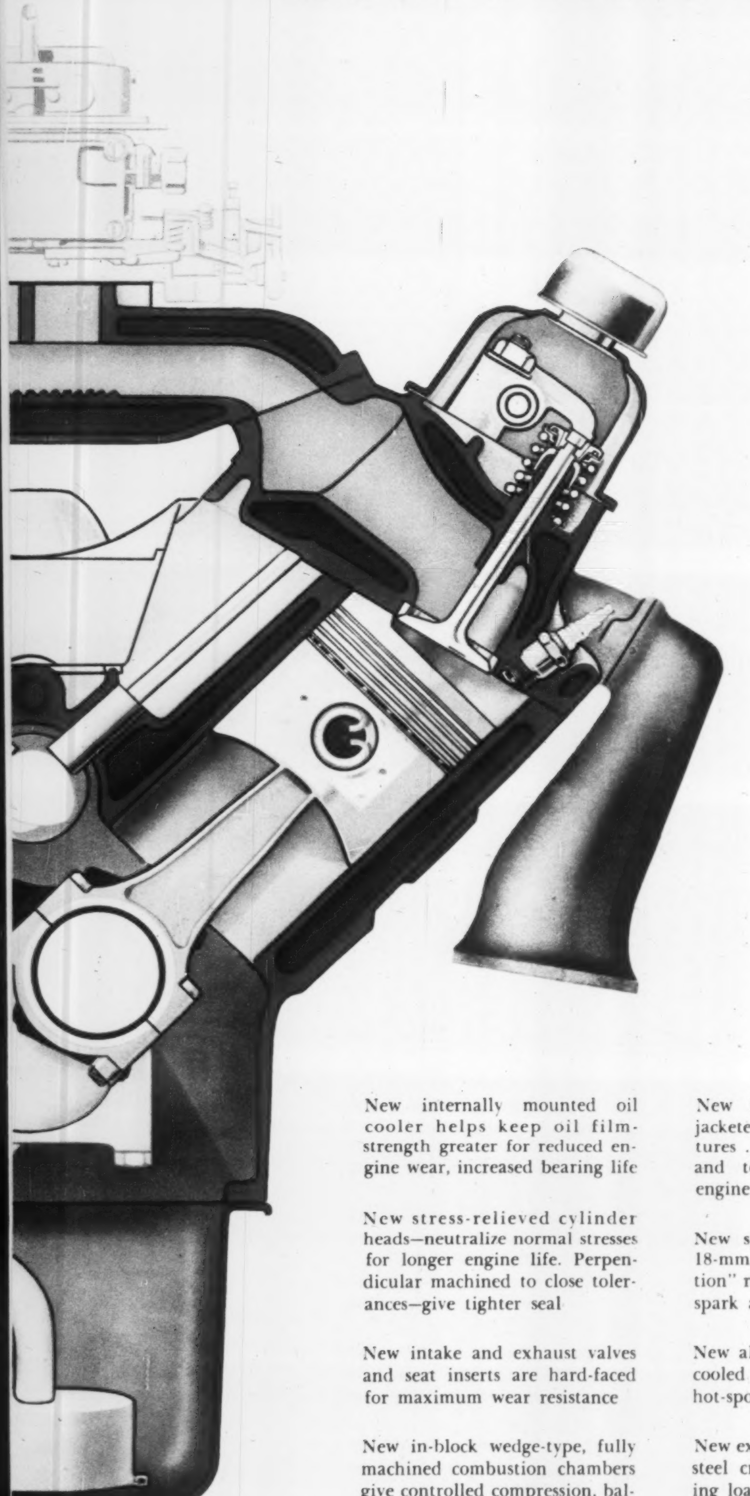
Saddle-type, step-type and cylindrical fuel tanks are available, complete with electric fuel pumps for extra dependability. Mighty Super Duty engines and Ford Extra Heavy Duty chassis form a combination of power and ruggedness that can't be beat. Springs, axles, brakes—all components are engineered to give exceptional service. All the new Ford advancements for '58 mean *Ford Trucks Cost Less* . . . less to own . . . less to run . . . last longer, too!

QUICK FACTS

CONVENTIONAL MODELS	ENGINE		REAR AXLE		MAX. TIRES	GVW'S (lb.)		GCW'S (lb.)	
	Standard	Optional	Standard	Optional		Standard	Optional	Standard	Optional
F-1100	277-hp 534 V-8		22,000 lb.	29,000 lb.*	12 x 24.5—12 PR	30,000	36,000	65,000	
F-1000	260-hp 477 V-8		21,000 lb.	22,000 lb.	12 x 24.5—12 PR	30,000		55,000	65,000
F-950	226-hp 401 V-8		21,000 lb.		12 x 24.5—12 PR	29,000		55,000	
F-850	226-hp 401 V-8		18,000 lb.		11 x 22.5—12 PR	25,000		50,000	
TILT CAB MODELS									
C-1100	277-hp 534 V-8		22,000 lb.	29,000 lb.**	12 x 24.5—12 PR	31,000	36,000	65,000	
C-1000	260-hp 477 V-8		21,000 lb.	22,000 lb.	12 x 24.5—12 PR	31,000		55,000	65,000
C-950	226-hp 401 V-8		21,000 lb.		12 x 24.5—12 PR	30,000		55,000	
C-850	226-hp 401 V-8		18,000 lb.		11 x 22.5—12 PR	26,000		50,000	
TANDEM MODELS									
T-950	226-hp 401 V-8	260-hp 477 V-8 277-hp 534 V-8	38,000 lb.		12 x 24.5—12 PR	46,000	48,000 51,000	75,000	
T-850	226-hp 401 V-8	260-hp 477 V-8 277-hp 534 V-8	34,000 lb.	28,000 lb.	11 x 22.5—12 PR	43,000	37,000 45,000	— 70,000	55,000 —

**Not available on 132" wb. model.* ***Not available on 99" wb. model.*

Now from FORD . . . durable



Big, modern all-truck engines! Up to 534-cu. in. Displacement . . . 277 Horsepower for New Ford Extra Heavy Duty Models

New Ford Super Duty V-8's have up to 534-cubic inch displacements . . . up to 277 horsepower for rugged performance. Three great new "over square" (bore larger than stroke) Short Stroke V-8 truck engines for new Ford Extra Heavy Duty models. The most modern, most efficient gasoline engines in their field. They're ultra-modern . . . designed for today's hauling needs.

Engineered to develop more horsepower per pound, with rugged new durability features for longer-lasting dependability. And for routine maintenance their clean, simple design gives maximum accessibility for servicing. Powerful new Ford Super Duty V-8's have been thoroughly road tested by leading truck fleets, coast to coast . . . they're ready to bring you new power, durability and economy!

New internally mounted oil cooler helps keep oil film-strength greater for reduced engine wear, increased bearing life

New stress-relieved cylinder heads—neutralize normal stresses for longer engine life. Perpendicular machined to close tolerances—give tighter seal

New intake and exhaust valves and seat inserts are hard-faced for maximum wear resistance

New in-block wedge-type, fully machined combustion chambers give controlled compression, balanced power from each cylinder

New intake manifold – water-jacketed for stabilized temperatures . . . aids high horsepower and torque output, improves engine economy

New spark plug accessibility – 18-mm. plugs with "Turbo Action" resist fouling, give positive spark action

New alternately spaced sodium-cooled exhaust valves reduce hot-spot dangers, last longer

New externally balanced, forged-steel crankshaft equalizes bearing loads for greater durability, longer bearing life

New Turbulence-Top pistons for maximum power, top ring groove carrier for extended groove life and thermal-controlled integral strut for better piston sizing

New, stronger "pyramid" connecting rods—hollow-milled for better balance

New extra-large Full-Flow oil filter – big 2-quart capacity for double filtering area

New high-capacity rotor-type oil pump mounted within the oil pan for more efficient lubrication system

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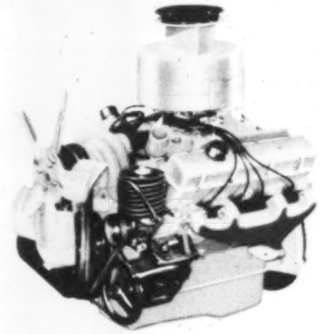
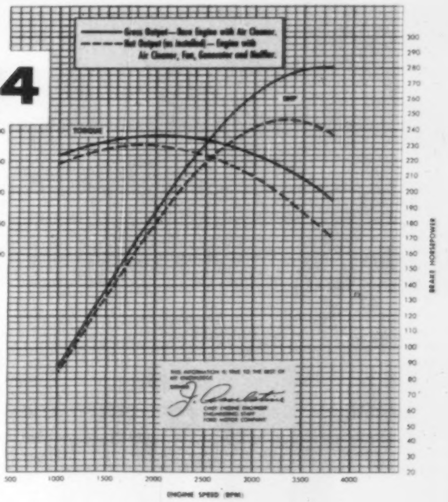
new Super Duty power

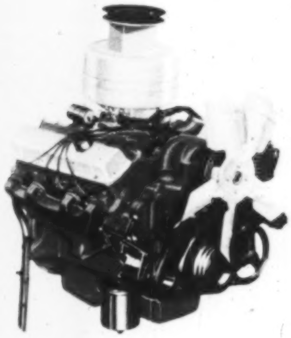


277-hp 534 SD V-8
Brake Horsepower—277 @ 3400 rpm
Torque—490 lbs-ft @ 1800-2300 rpm
Bore—4.50 in. **Stroke**—4.20 in.

The big, new Ford 534 is an "over square" Short Stroke engine, like all Ford Super Duty V-8's. Here's snappy power, long-lasting durability and top economy. Standard in Ford F-1100, C-1100 trucks. Optional in T-850, T-950 tandems.

534

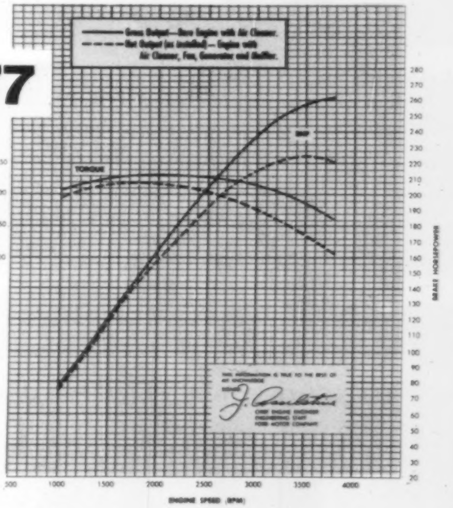


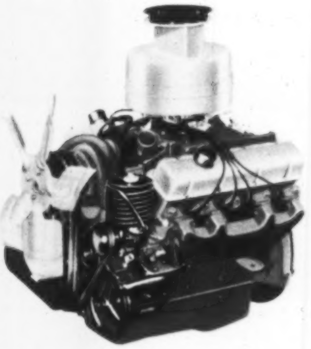


260-hp 477 SD V-8
Brake Horsepower—260 @ 3600 rpm
Torque—430 lbs-ft @ 1800-2300 rpm
Bore—4.50 in. **Stroke**—3.75 in.

Now . . . 477 cubic inches of super power for your Extra Heavy Duty needs! Notice the high and flat torque curve (power curve at right) to insure maximum performance. Standard engine in Ford F-1000, C-1000 trucks. Optional T-850, T-950 tandem models.

477

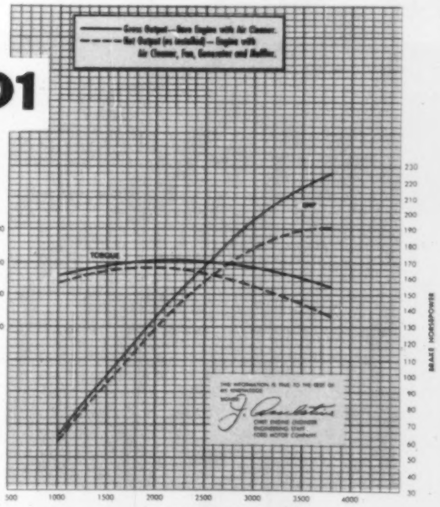




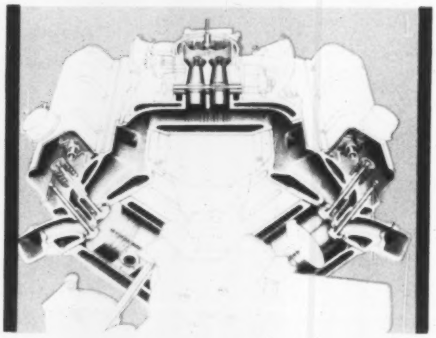
226-hp 401 SD V-8
Brake Horsepower—226 @ 3800 rpm
Torque—350 lbs-ft @ 1800-2300 rpm
Bore—4.12 in. **Stroke**—3.75 in.

For higher earnings every trip, Ford Super Duty V-8's like this popular 401-cubic inch engine provide the best horsepower to weight ratios obtainable in comparable all-truck engines today. Standard in Ford F-, C- & T-850 and 950 models.

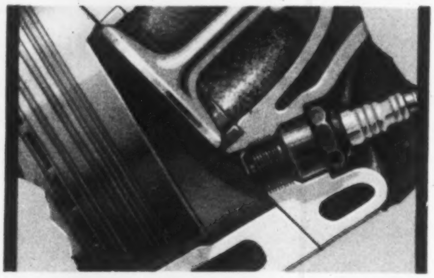
401



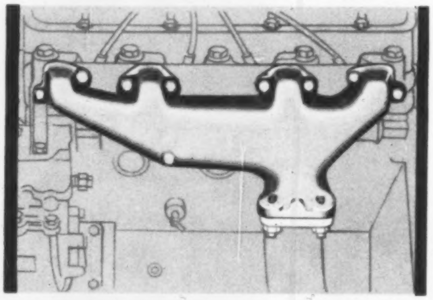
Outstanding new FORD V-8



NEW INTAKE MANIFOLDING—Much of the exceptional performance of Ford's new Super Duty V-8's can be traced to their free-breathing design. Thermostatically controlled carburetor air intake, Super-Filter air cleaner, 4-barrel carburetor, simplified intake manifold—with water-jacketed passages and large intake valves—provide high intake efficiency. The modern single-bridge intake manifold distributes the fuel-air mixture more evenly for smoother performance. And its water-jacketed passages provide a more uniform fuel-air temperature.

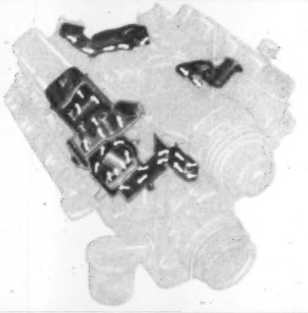


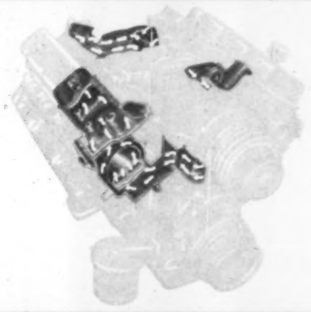
MACHINED COMBUSTION CHAMBERS—New wedge-shape combustion chambers are fully machined for accurate volume and compression control. Completely in the block, there's less heat in the heads for improved valve cooling. The face of the head is flat-machined at 90° for positive mating with the block. The new wedge-shape chamber design together with Turbulence-Top piston heads gives better fuel-air turbulence for snappy power and minimized combustion deposits, and advanced "over square" (bore larger than stroke) Short Stroke engine design increases usable horsepower and torque . . . cuts internal friction for long engine life and greater fuel economy.

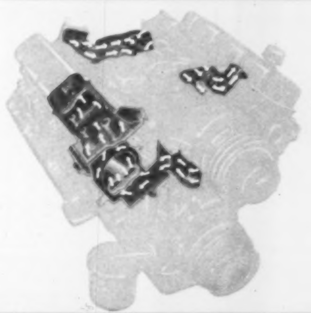


LOW BACK-PRESSURE EXHAUST MANIFOLDING—Improved exhaust manifolding reduces back pressure . . . means more usable power and longer engine life. For full performance, burned gases must be properly removed to make room for a fresh charge of fuel-air mixture. And on the new Ford Super Duty V-8 engines exhaust gases leave through large exhaust ports, down wide passages in the cylinder head to the generously sized exhaust manifolds and out dual exhaust pipes to complete the breathing cycle most efficiently.

DESIGN features







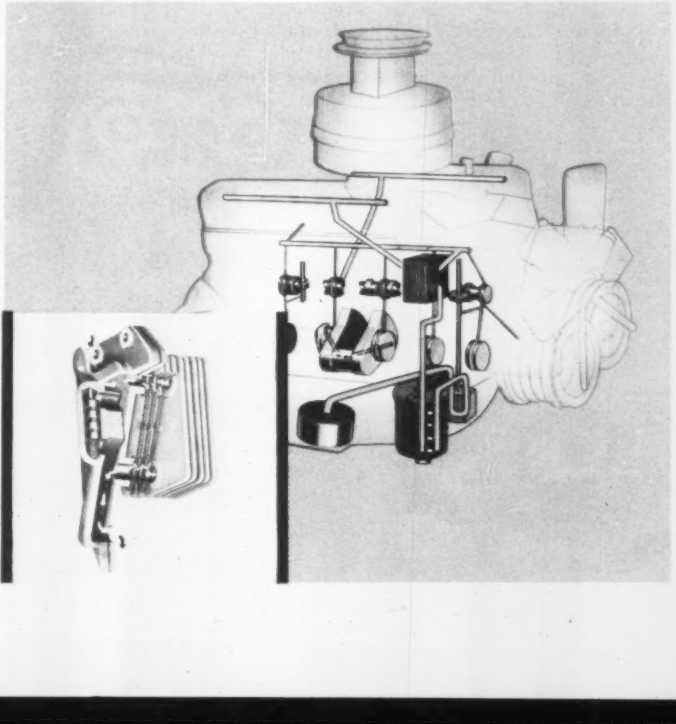
MODERN 3-STAGE PARALLEL FLOW COOLING

1. HEAD – For cold starts, both thermostats are closed and the coolant is pumped through the cylinder head and manifold water jacket, returning through a bypass to the pump. This restricted flow continues until the coolant reaches 140°. The rapid head warm-up preheats the fuel-air mixture for more efficient burning and greater power. Fast block warm-up also occurs, warming the oil for better lubrication.

2. HEAD AND BLOCK–At 140°, the back thermostat opens allowing coolant to circulate more rapidly through the block. The coolant flows through the head, block and intake manifold water jacket, but closed front thermostat prevents it from flowing through the radiator. It returns through a bypass to the water pump and is recirculated. This continues until the coolant in the intake manifold reaches 160°.

3. COMPLETE COOLING – At 160°, the front thermostat opens allowing the coolant to flow through the radiator and the entire cooling system. Approximately half of the coolant is directed to the heads and the other half to the block. This 3-stage system gives fast engine warm-up and effective cooling. Over ten thousand gallons of coolant per hour are pumped by the durable, high-capacity water pump.

NEW LUBRICATION SYSTEM



FULL-PRESSURE LUBRICATION SYSTEM – Oil is pumped under pressure through galleries in the block and head to the crankshaft main and connecting rod journals, camshaft journals, rocker shaft and arms, air compressor and timing gears. Valve stems, cam lobes, piston pins and valve lifters are effectively splash and gravity lubricated. Squirt holes in the connecting rods direct oil to cylinder walls.

Troublesome external oil lines have been virtually eliminated. And all oil is filtered passing through the large 2-quart Full-Flow oil filter.

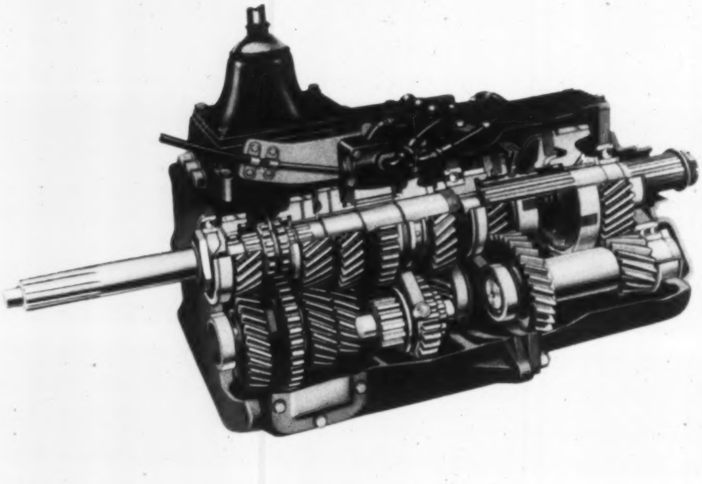
INTERNAL OIL COOLING–A tremendous "plus" of the Ford lubrication system is the easily accessible internally mounted oil cooler. Standard equipment on all Super Duty V-8's, it's designed to keep the engine's oil at proper temperatures in extra-heavy-duty service. The oil cooler reduces oil temperatures to minimize carbonization . . . promotes greater oil film-strength . . . prolongs moving part life, main bearing, etc. . . . and extends time between oil changes.

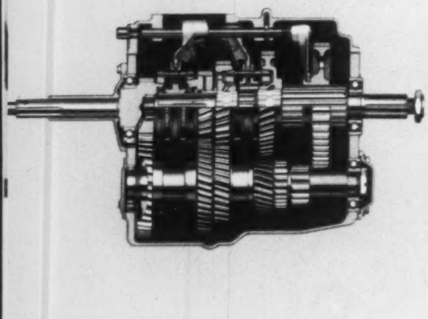
TWO-PLATE 13" CLUTCH – New, solid dual disc 13-inch clutch provides dependable, positive operation. Direct pressure is applied to the pressure plate by 12 coil springs. And the large facing area with two-plate design gives high torque capacity and long service.

For your extra-heavy-duty needs, Ford offers a wide selection of power train components designed for your individual requirements. Extra strength and capacity is engineered into each and every part to take the tremendous horsepower and torque output of the new Ford Super Duty engines . . . and to stand up under the big payloads Ford Extra Heavy Duty trucks are rated to haul. Transmissions, auxiliaries, clutches and Single- or Two-Speed rear axles are all engineered for outstanding performance and long, dependable service.

Extra strength in every

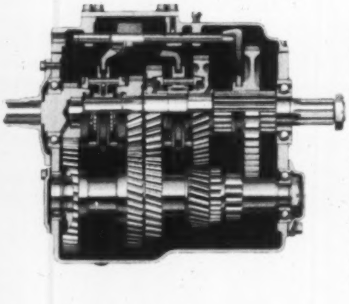
8-SPEED ROADRANGER – Designed for extra-heavy-duty over-the-road service, the Roadranger transmission provides 8 evenly spaced, progressive gear ratio steps. A four-speed constant mesh main gear box is coupled with an integrally mounted, synchronized Two-Speed reduction unit . . . giving 8 forward speeds to get loads under way faster and maintain highway speeds better. Shifting is powered by air, manually controlled by a convenient switch on the shift lever.





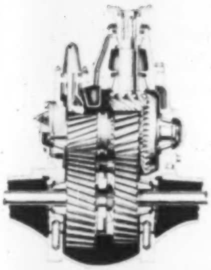
4000 SERIES SPICER TRANSMISSIONS

5-Speed Synchro-Silent, Direct-in-fifth transmissions are offered in a wide-ratio version, for use primarily with Single-Speed rear axles or with Two-Speed axles for off-the-road use. Close-ratio version for use with Two-Speed axles over-the-road.



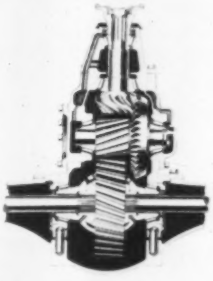
6000 SERIES SPICER TRANSMISSIONS

5-Speed Synchro-Silent, Direct-in-fifth or Overdrive-in-fifth (reduces engine revolutions about 17%) transmissions. Direct Drive is offered in both wide-ratio and close-ratio versions. Overdrive is close-ratio only.



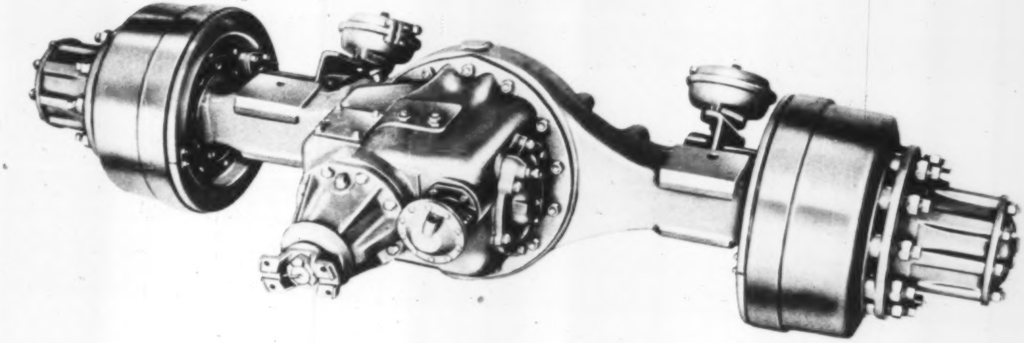
U-200

Rugged Single-Speed, double reduction, 29,000-lb. hypoid rear axle. Available with 6352 transmission on F- & C-1100 models. Not available on 99″ or 132″ wb. models.

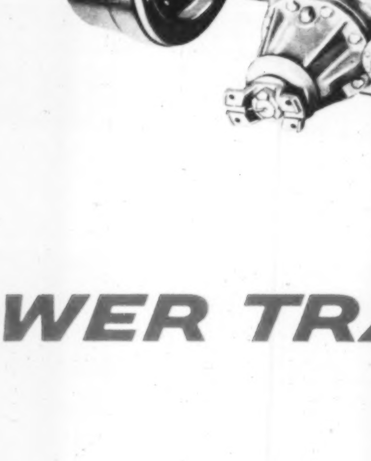


U-300

Big capacity Two-Speed, double reduction, 29,000-lb. hypoid rear axle. Available on F- & C-1100 models with 6352 transmission. Not available on 99″ or 132″ wb. models.

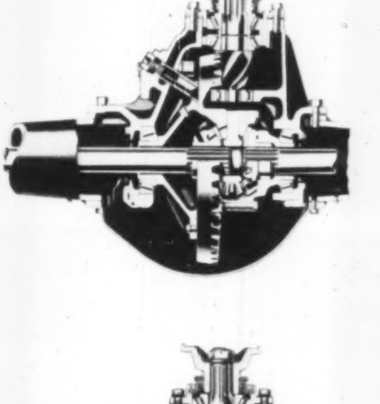


POWER TRAIN component



18,000-LB. SINGLE-SPEED
21,000-LB. SINGLE-SPEED
22,000-LB. SINGLE-SPEED

Spiral bevel, full-floating rear axle. Pinion is straddle-mounted for accurate alignment under high torque loads. All gears are alloy-steel, carburized and hardened for strength and wear resistance. And extra-capacity tapered-roller wheel bearings provide long, dependable service.

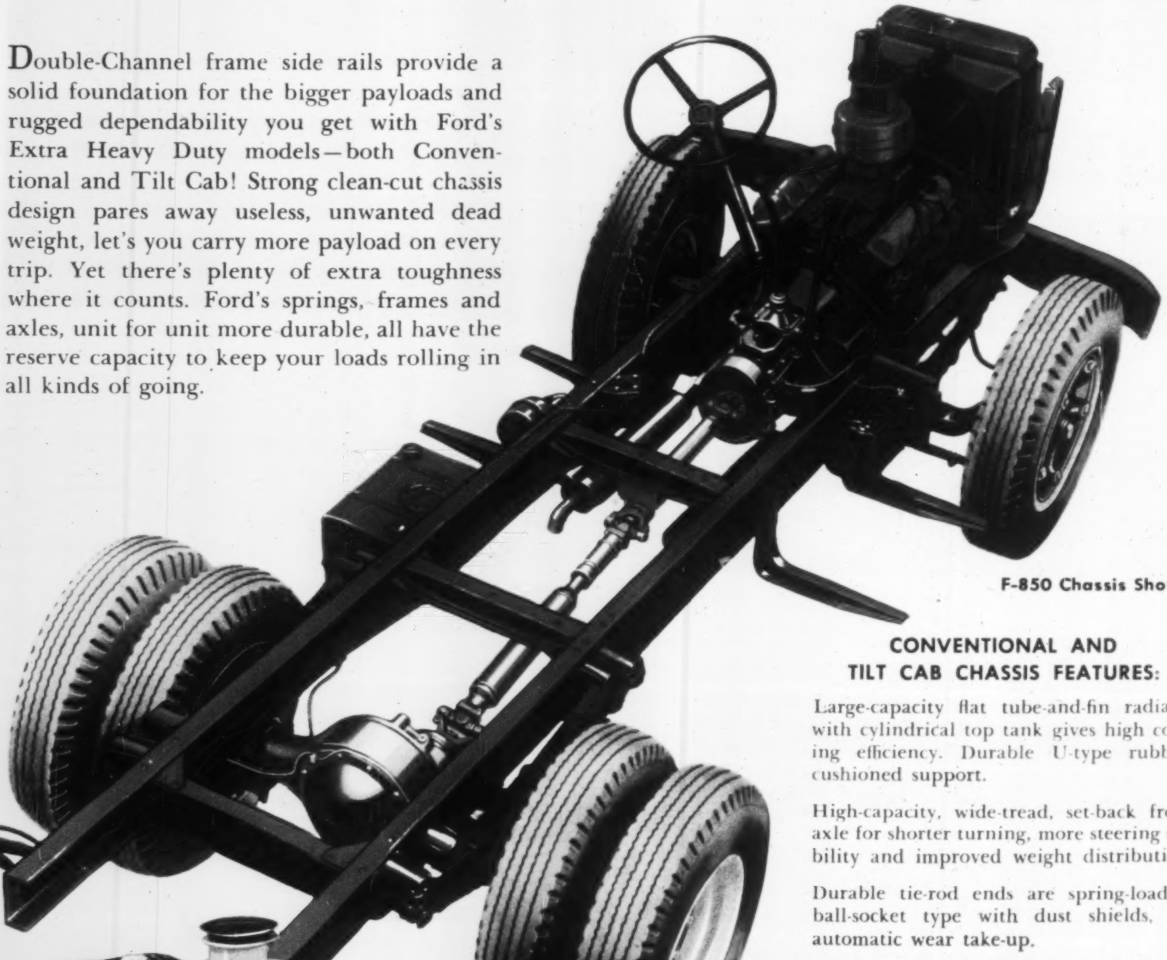


18,000-LB. TWO-SPEED
21,000-LB. TWO-SPEED
22,000-LB. TWO-SPEED

Spiral bevel, Two-Speed, full-floating rear axles. A planetary reduction gear set between the ring gear and differential provides two selective ratios for greater flexibility of truck operation. Easy to operate, positive-action, electric-shift control allows fast, easy shifting.

FORD Extra Heavy Duty

Double-Channel frame side rails provide a solid foundation for the bigger payloads and rugged dependability you get with Ford's Extra Heavy Duty models—both Conventional and Tilt Cab! Strong clean-cut chassis design pares away useless, unwanted dead weight, let's you carry more payload on every trip. Yet there's plenty of extra toughness where it counts. Ford's springs, frames and axles, unit for unit more durable, all have the reserve capacity to keep your loads rolling in all kinds of going.



F-850 Chassis Shown

CONVENTIONAL AND TILT CAB CHASSIS FEATURES:

Large-capacity flat tube-and-fin radiator with cylindrical top tank gives high cooling efficiency. Durable U-type rubber-cushioned support.

High-capacity, wide-tread, set-back front axle for shorter turning, more steering stability and improved weight distribution.

Durable tie-rod ends are spring-loaded, ball-socket type with dust shields, for automatic wear take-up.

Channel front bumper attached directly to frame, for greater rigidity.

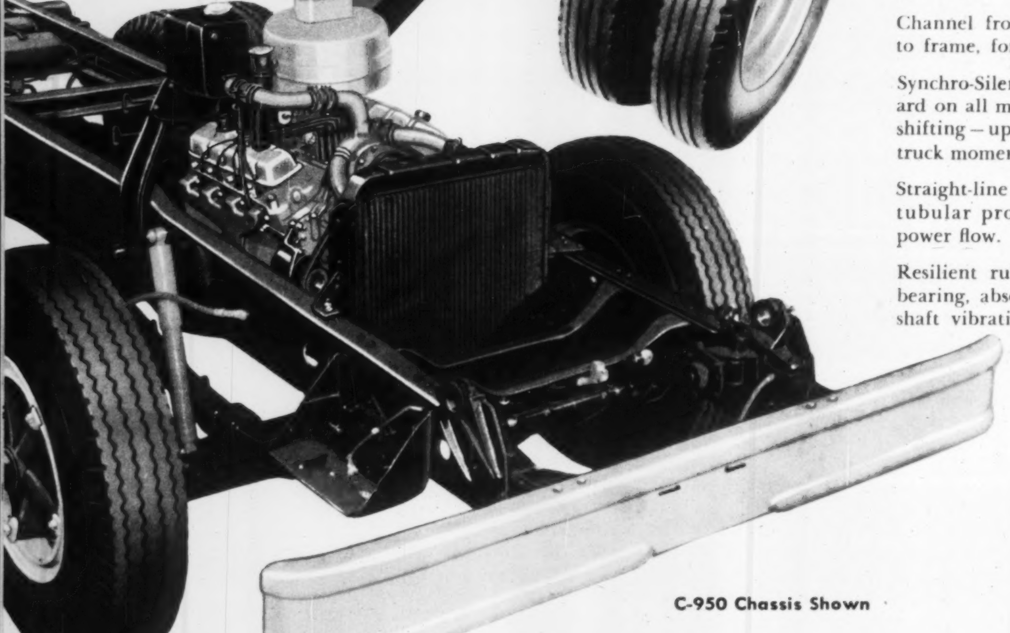
Synchro-Silent type transmission is standard on all models to provide faster, easier shifting—up or down—with less loss of truck momentum, less driver effort.

Straight-line drive with large diameter tubular propeller shafts gives smooth power flow.

Resilient rubber cushion encases center bearing, absorbs up to 80% of propeller shaft vibration.

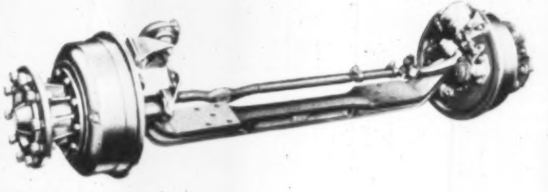
Wide-span rear and auxiliary springs provide sturdy, balanced support and smooth ride.

Single-Speed rear axle with one-piece banjo housing, standard; electric-shift, Two-Speed planetary type available.



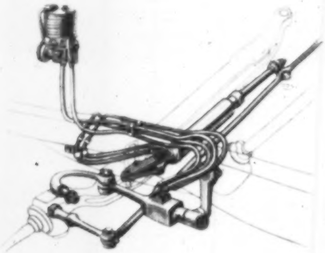
C-950 Chassis Shown

chassis construction

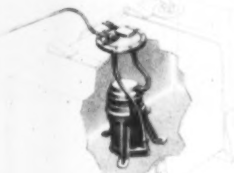


New Front Axles with modified I-beam construction, reinforced at stress points for extra durability. Available in 7000-, 9000-, 11000- and 15000-lb. capacities.

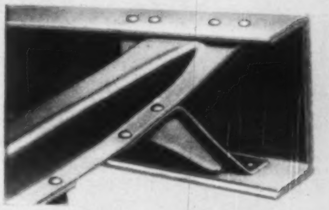
Roll-Action Steering with worm-and-roller type steering gear reduces friction, makes steering easier. Needle-bearing roller provides rolling rather than sliding action.



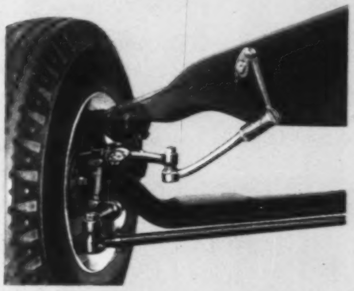
Master-Guide Power Steering is available on all F- and C-Series Extra Heavy Duty models . . . cuts steering effort as much as 75%.



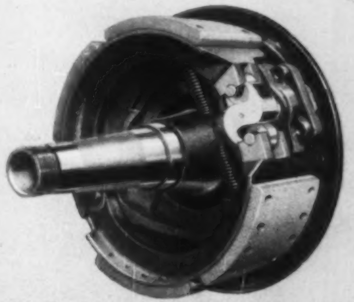
New Electric Fuel Pump mounted in fuel tank. Big capacity, submerged-type fuel pump delivers only liquid fuel—no vapor—under pressure from tank to carburetor. Not dependent on engine rpm's . . . provides ample fuel at any vehicle speed.



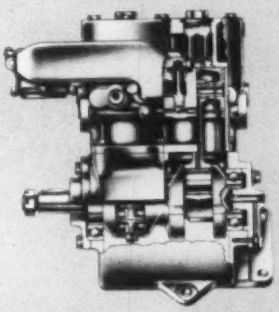
Double-Channel Frame Rails are engineered for extra strength and are highly resistant to twist and weave. Side rails have full channel reinforcement from front to rear springs.



Steering Linkage, solid Direct-Acting drag link, U-type steering arm and adjustable tie rod give excellent steering control and maneuverability.

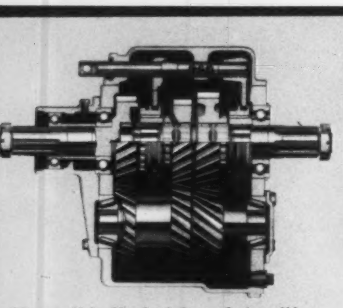


Full-Air Brakes are standard on F- and C-1000 and 1100 models, available 850 and 950. Compressor, two reservoir tanks, buzzer low-pressure indicator and air-operated windshield wipers included.

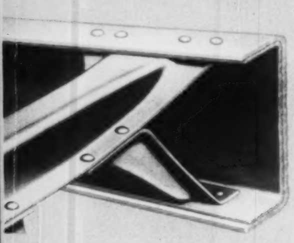


Big 12-cubic foot Air Compressor is available in place of standard 7¼-cu. ft. with full-air brakes on F- and C-950 thru 1100. Large 12-cubic foot per minute capacity provides extra safety factor.

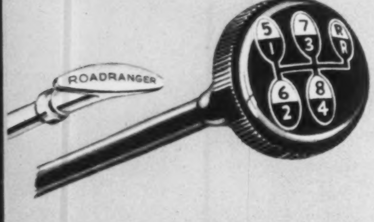
FORD Tandem Chassis for



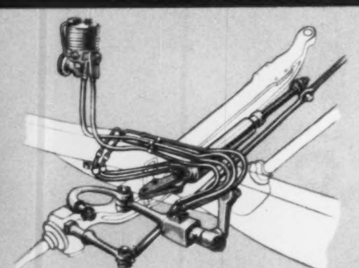
Two all-helical, 3-Speed Auxiliary constant mesh transmissions are available (except 144″ wb. T-850) for greater operating flexibility.



Double-Channel frame side rails for extra strength, lower weight. Channel-reinforced from front spring to end of frame.



Roadranger Transmission with 8 closely spaced forward speeds and preselect range shifting is optional for all models. Not offered with auxiliary transmission.



Master-Guide Power Steering standard . . . always operative, cuts steering effort up to 75%.

Large capacity flat-tube radiator with cylindrical top tank gives high cooling efficiency. Durable U-type support.

High-capacity, wide-tread, set-back front axle provides shorter turning, more stability, improved weight distribution.

Durable tie-rod ends are spring-loaded, ball-socket type with dust shields, for automatic wear take-up.

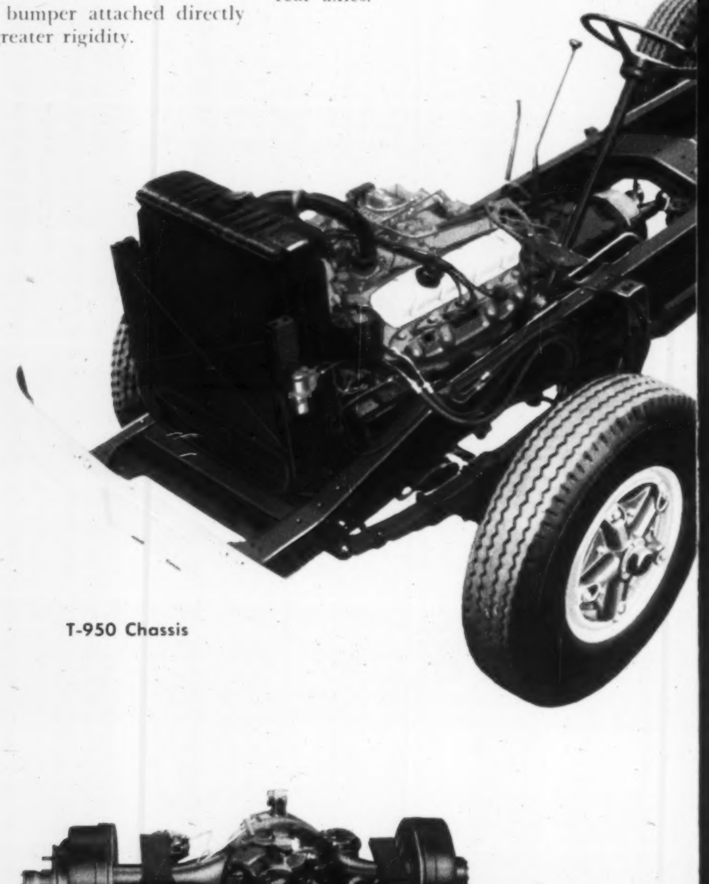
Synchro-Silent 5-Speed direct transmission is standard for faster, easier shifting.

Channel front bumper attached directly to frame, for greater rigidity.

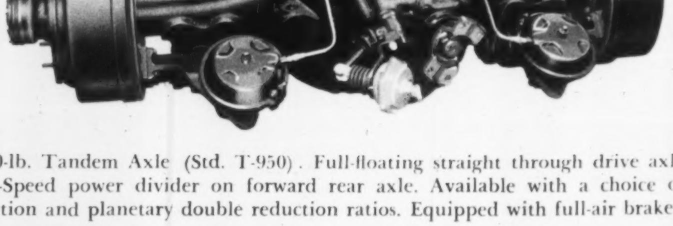
Tubular propeller shafts, large diameter, non-whipping. Long-lived needle-bearing joints. Rubber-encased drive line center bearing for longer life.

Torque arms absorb starting and stopping thrusts. Arms are rubber bushed at each end, and need no lubrication.

Power divider, provided with 3rd differential, equalizes the driving power between axles, eliminates axle fight for longer gear and tire life. The third differential may be locked out, to give positive drive to both rear axles.



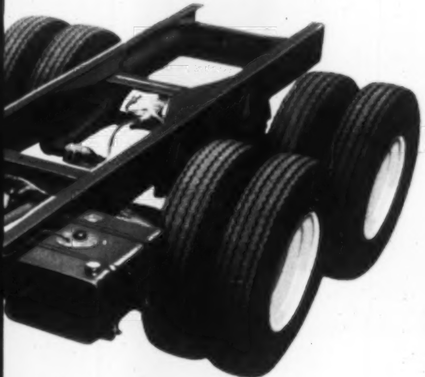
T-950 Chassis

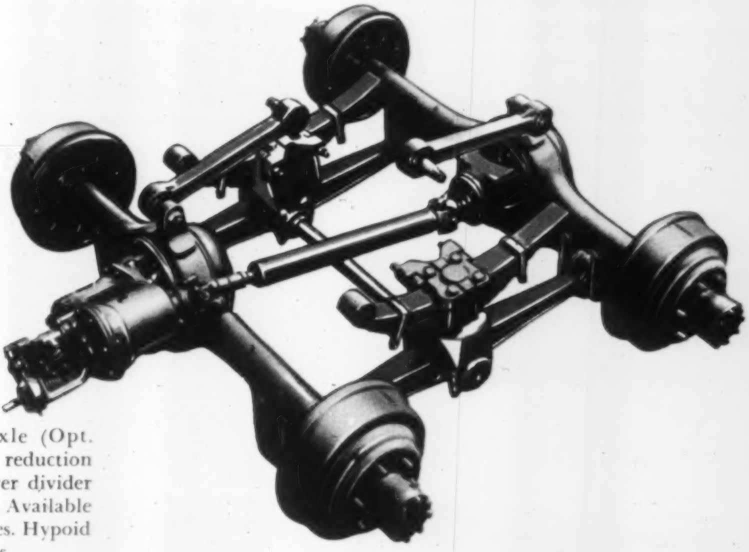


38D—38,000-lb. Tandem Axle (Std. T-950). Full-floating straight through drive axle with Single-Speed power divider on forward rear axle. Available with a choice of single reduction and planetary double reduction ratios. Equipped with full-air brakes.

extra payloads

More flotation is provided by eight rear tires . . . keeps truck from bogging down in mud, sand and other soft footing where single-rear-axle trucks would normally flounder. Walking-beam action levels bumps by 50%, minimizes "bounce."

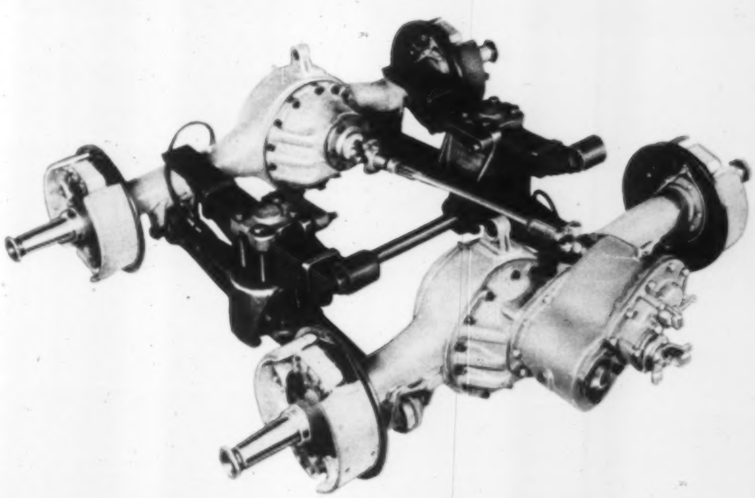




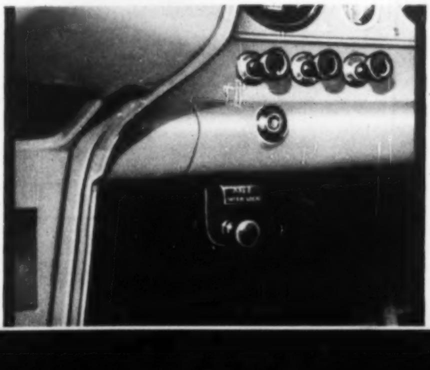
28M—28,000-lb. Tandem Axle (Opt. T-850). Full-floating, single reduction type with a Single-Speed power divider mounted on forward rear axle. Available with hydraulic or full-air brakes. Hypoid ring gear and pinion gear sets.

Two equalizing beams provide true axle alignment, distribute weight between axles. Rubber bushings do away with the need for lubrication.

Husky, short-coupled springs minimize side-sway, absorb road shocks, give smooth, level ride.



34M—34,000-lb. Tandem Axle (Std. T-850). Full-floating, single reduction type with a Single-Speed power divider mounted on forward rear axle. Available with hydraulic or full-air brakes. Spiral bevel ring gear and pinion gear sets.



Differential lockout control located on the instrument panel permits driver to lock out differential action giving each axle the same positive traction as if separately driven.

F-SERIES POWER TRAIN SELECTIONS

Engine—Transmission—Axle Ratio (to 1) Combinations

	F-850 with 401 SD V-8 Engine		F-950 with 401 SD V-8 Engine	
Transmission	**18,000-lb. axle**	**18,000-lb. 2-Speed axle**	**21,000-lb. axle**	**21,000-lb. 2-Speed axle**
4652	6.50 or 7.17	6.50/8.87 or 7.17/9.77*	6.50 or 7.17	6.50/8.87 or 7.17/9.77*
4756C	—	6.50/8.87 or 7.17/9.77*	—	6.50/8.87 or 7.17/9.77*
6352	6.50 or 7.17	6.50/8.87 or 7.17/9.77*	6.50 or 7.17	6.50/8.87 or 7.17/9.77*
6852G	—	6.50/8.87 or 7.17/9.77*	—	6.50/8.87 or 7.17/9.77*
6453A	6.50 or 7.17	6.50/8.87 or 7.17/9.77*	6.50 or 7.17	6.50/8.87 or 7.17/9.77*
R-46	6.50	—	6.50	—

	F-1000 with 477 SD V-8		F-1000 with 477 SD V-8 F-1100 with 534 SD V-8		F-1100 with 534 SD V-8	
Transmission	**21,000-lb. axle**	**21,000-lb. 2-Speed axle**	**22,000-lb. axle**	**22,000-lb. 2-Speed axle**	**29,000-lb. axle**	**29,000-lb. 2-Speed axle**
6352	6.50 or 7.17	6.50/8.87	6.17 or 6.67	6.14/8.36 or 6.71/9.13†	7.03	6.42/8.38 or 7.09/9.07
6852G	—	6.50/8.87	—	6.14/8.36 or 6.71/9.13†	—	—
6453A	6.50 or 7.17	6.50/8.87	6.17 or 6.67	6.14/8.36 or 6.71/9.13†	—	—
R-46	6.50	—	6.17 or 6.67	—	—	—

*Not recommended for tractor service.

†Not recommended for tractor service on F-1100 Series.

F-850 Specifications GVW 25,000 lb. • GCW 50,000 lb.

AXLE, FRONT

Standard Axle Capacity—lb.	7,000
Optional Axle Capacity—lb.	11,000

Includes 5,000-lb. front springs. Requires air brakes, power steering and cast spoke or 10-hole disc wheels.

AXLE, REAR

Capacity—lb.	18,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.50 or 7.17 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.50/8.87 or 7.17/9.77*

*7.17/9.77 ratio not recommended for tractor service.

BRAKES, SERVICE

Standard—Type	Vacuum-Power Operated, Hydraulic, Two-Shoe Front: Double Anchor. Rear: Two-Cylinder, Self-Energizing
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 2¼—0.25
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 5—0.50
Total Area (Lining)—sq. in.	488.6
Booster (Effective Diaphragm Dia.)—in.	10¼
Optional—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 2½—0.312
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	579.3
Compressor	7¼ cu. ft, per min.
Air Reservoir Tanks	Two—830-cu. in. Cap'y each

BRAKE, HAND

Standard—Type	Drum and Contracting Band at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	10½ x 3—97.7
Optional—Type (with 6000 Series and R-46 Transmissions)	Internal Shoe
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—46
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number	Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control

Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	226-hp 401 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.5 x 3.0 x 0.25
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.0 x 2.56 x 0.15
Section Modulus	14.93
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 100-gal. Step Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side (Cylindrical not avail. on 132" wb.; Step Tanks require Air Brakes)

SPRINGS

	Front	Rear	
Semi-Elliptic, Ford Alloy Steel		Main	Auxiliary
Length x Width—in.	52 x 3	56 x 3	37.5 x 3
Number of Leaves	7	10	7
Capacity at Spg. Pad (Norm. Defl.)—Per Spring	2500 lb.	7800 lb. (combined)	
Optional Spring Capacity	3000 lb.	8700 lb. (combined)	

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—20.5 to 1

Wheelbase	132"	144"	156"	175"	192"
Turning Circle Dia., Right or Left—ft.	46.2	49.5	52.8	58.0	62.7

Optional—Type	Master-Guide Power Steering

TRANSMISSION

Standard	Spicer 4652 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 4756C 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.50 axle ratio and air brakes required)

Gear Positions Ratios (to 1):	First	Second	Third	Fourth	Fifth	Reverse
4652 5-Speed Direct	7.40	4.00*	2.47*	1.46*	1.00*	7.84
4756C 5-Speed Direct	6.50	3.52*	1.93*	1.17*	1.00*	6.88
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09
8-Speed Roadranger	(9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)					

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 6.75
Tires—Number—Size	Six—10-22.5 10 PR

F-950 Specifications GVW 29,000 lb. • GCW 55,000 lb.

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000

Includes 5,000-lb. front springs. Requires air brakes, power steering.

AXLE, REAR

Capacity—lb.	21,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.50 or 7.17 to 1
Optional Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.50/8.87 or 7.17/9.77*

*7.17/9.77 ratio not recommended for tractor service.

BRAKES, SERVICE

Standard—Type	Vacuum-Power Operated, Hydraulic, Two-Shoe Front: Double Anchor. Rear: Two-Cylinder, Self-Energizing
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 2¼—0.25
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 6—0.50
Total Area (Lining)—sq. in.	556.2
Booster (Effective Diaphragm Dia.)—in.	9½
Optional—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16¼ x 3½—0.44
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	650.0
Compressor	7¼ cu. ft. per min.
Air Reservoir Tanks	Two—1,150-cu. in. Cap'y each
Optional Compressor	12 cu. ft. per min.

BRAKE, HAND

Standard—Type	Drum and Contracting Band at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	10½ x 3—97.7
Optional—Type (with 6000 Series and R-46 Transmissions)	Internal Shoe
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—46
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number	Two,Tubular, Forged-Steel Ends
Universal Joints—Number, Type	Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control

Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	226-hp 401 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.28
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.03 x 0.25
Section Modulus	21.75
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 100-gal. Step Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side (Cylindrical not avail. on 132" wb.; Step Tanks require Air Brakes)

SPRINGS

	Front	Rear	
Semi-Elliptic, Ford Alloy Steel		Main	Auxiliary
Length x Width—in.	52 x 3	56 x 3	37.5 x 3
Number of Leaves	7	10	7
Capacity at Spg. Pad (Norm. Defl.)—Per Spring	3000 lb.	9250 lb.	(combined)
Optional Spring Capacity	4000 lb.	10000 lb.	(combined)

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	132"	144"	156"	175"	192"
Turning Circle Dia., Right or Left—ft.	46.1	49.4	52.7	57.9	62.6

Optional—Type	Master-Guide Power Steering

TRANSMISSION

Standard	Spicer 4652 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 4756C 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.50 axle ratio and air brakes required)

Gear Positions Ratios (to 1):	First	Second	Third	Fourth	Fifth	Reverse
4652 5-Speed Direct	7.40	4.00*	2.47*	1.46*	1.00*	7.84
4756C 5-Speed Direct	6.50	3.52*	1.93*	1.17*	1.00*	6.88
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09
R-46 8-Speed Roadranger	(9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)					

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 7.5
Tires—Number—Size	Six—11-22.5 12 PR

F-1000 Specifications

GVW 30,000 lb. • GCW 55,000 lb. (Opt. GCW 65,000 lb.*)

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs. Requires power steering.	
Optional Axle Capacity—lb.	15,000
Includes 6,800-lb. front springs. Requires power steering.	

AXLE, REAR

Capacity—lb.	21,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.50 or 7.17 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.50/8.87
Optional Capacity—lb.	22,000
Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.17 or 6.67 to 1
Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.14/8.36 or 6.71/9.13

BRAKES, SERVICE

Standard—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16¼ x 3½—0.44
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	650.0
Compressor	7¼ cu. ft. per min.
Air Reservoir Tanks	Two—1,150-cu. in. Cap'y each
Optional Brakes (w/9,000- or 11,000-lb. Front and 22,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	718.2
Optional Brakes (w/15,000-lb. Front and 21,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	664.6
Optional Brakes (w/15,000-lb. Front and 22,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	732.8
Optional Compressor	12 cu. ft. per min.

BRAKE, HAND

Type	Internal Shoe at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—46
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number	Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control
Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier	

ENGINE

Standard	260-hp 477 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.28
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.03 x 0.25
Section Modulus	21.75
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 100-gal. Step Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side (Cylindrical not avail. on 132" wb.)

SPRINGS

	Front	*Rear*	
Semi-Elliptic, Ford Alloy Steel		*Main*	*Auxiliary*
Length x Width—in.	52 x 3	56 x 3	37.5 x 3
Number of Leaves	7	10	9
Capacity at Spg. Pad (Norm. Defl.)—Per Spg.	3000 lb.	9650 lb. (combined)	
Optional Spring Capacity	4000 lb.	10400 lb. (combined)	

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	132"	144"	156"	175"	192"
Turning Circle Dia., Right or Left—ft.	46.1	49.4	52.7	57.9	62.6

Optional—Type	Master-Guide Power Steering

TRANSMISSION

Standard	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.17, 6.50 or 6.67 axle ratio required)

Gear Positions Ratios (to 1):	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09

R-46 8-Speed Roadranger (9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 7.5
Tires—Number—Size	Six—11-22.5 12 PR

**Requires 22,000-lb. rear axle*

F-1100 Specifications

GVW 30,000 lb. • GCW 65,000 lb. (Opt. GVW 36,000 lb.*)

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs. Requires power steering.	
Optional Axle Capacity—lb.	15,000
Includes 6,800-lb. front springs. Requires power steering.	

AXLE, REAR

Capacity—lb.	22,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.17 or 6.67 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.14/8.36 or 6.71/9.13*
Optional Capacity—lb.	29,000**
Type	Double Reduction—Hypoid, Helical—Full-Floating
Axle Ratios	7.03 to 1
Type	Two-Speed Double Reduction—Full-Floating
Ratios (to 1)	6.42/8.38 or 7.09/9.07

*6.71/9.13 ratio not recommended for tractor service.

**With 6352 Transmission only. Not available with 132" wb.

BRAKES, SERVICE

Standard—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thick.)—in.	16¼ x 3½—0.312
Rear Brake (Drum Dia. x Lining Width—Thick.)—in.	16½ x 7—0.75
Total Area (Lining)—sq. in.	718.2
Compressor	7¼ cu. ft. per min.
Air Reservoir Tanks	Two—1,150-cu. in. Cap'y each
Optional Brakes (w/15,000-lb. Front and 22,000- or 29-000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	732.8
Optional Compressor	12 cu. ft. per min.

BRAKE, HAND

Type	Internal Shoe at Rear of Transmission on Drive Line
Size (Drum Diameter x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—47
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	23—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number	Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control
Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier	

ENGINE

Standard	277-hp 534 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.28
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.03 x 0.25
Section Modulus	21.75
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 100-gal. Step Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side (Cylindrical not avail. on 132" wb.)

SPRINGS

	Front	*Rear*	
Semi-Elliptic, Ford Alloy Steel		*Main*	*Auxiliary*
Length x Width—in.	52 x 3	56 x 3	37.5 x 3
Number of Leaves	7	10	9
Capacity at Spg. Pad (Norm. Defl.)—Per Spg.	3000 lb.	9650 lb. (combined)	
Optional Spring Capacity	4000 lb.	10400 lb. (combined)	

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	132"	144"	156"	175"	192"
Turning Circle Dia., Right or Left—ft.	46.1	49.4	52.7	57.9	62.6

Optional—Type	Master-Guide Power Steering

TRANSMISSION

Standard	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.17 or 6.67 axle ratio required)

Gear Positions Ratios (to 1):	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09

R-46 8-Speed Roadranger (9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 7.5
Tires—Number—Size	Six—11-22.5 12 PR

**Requires 11,000-lb. front axle, 29,000-lb. rear axle, HD rear main springs and special frame*

C-SERIES POWER TRAIN SELECTIONS
Engine—Transmission—Axle Ratio (to 1) Combinations

	C-850 with 401 SD V-8 Engine		C-950 with 401 SD V-8 Engine	
Transmission	**18,000-lb. axle**	**18,000-lb. 2-Speed axle**	**21,000-lb. axle**	**21,000-lb. 2-Speed axle**
4652	6.50 or 7.17	6.50/8.87 or 7.17/9.77*	6.50 or 7.17	6.50/8.87 or 7.17/9.77*
4756C	—	6.50/8.87 or 7.17/9.77*	—	6.50/8.87 or 7.17/9.77*
6352	6.50 or 7.17	6.50/8.87 or 7.17/9.77*	6.50 or 7.17	6.50/8.87 or 7.17/9.77*
6852G	—	6.50/8.87 or 7.17/9.77*	—	6.50/8.87 or 7.17/9.77*
6453A	6.50 or 7.17	6.50/8.87 or 7.17/9.77*	6.50 or 7.17	6.50/8.87 or 7.17/9.77*
R-46	6.50	—	6.50	—

	C-1000 with 477 SD V-8		C-1000 with 477 SD V-8 C-1100 with 534 SD V-8		C-1100 with 534 SD V-8	
Transmission	**21,000-lb. axle**	**21,000-lb. 2-Speed axle**	**22,000-lb. axle**	**22,000-lb. 2-Speed axle**	**29,000-lb. axle**	**29,000-lb. 2-Speed axle**
6352	6.50 or 7.17	6.50/8.87	6.17 or 6.67	6.14/8.36 or 6.71/9.13†	7.03	6.42/8.38 or 7.09/9.07
6852G	—	6.50/8.87	—	6.14/8.36 or 6.71/9.13†	—	—
6453A	6.50 or 7.17	6.50/8.87	6.17 or 6.67	6.14/8.36 or 6.71/9.13†	—	—
R-46	6.50	—	6.17 or 6.67	—	—	—

*Not recommended for tractor service.

†Not recommended for tractor service on C-1100 Series.

C-850 Specifications GVW 26,000 lb. • GCW 50,000 lb.

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs. Requires air brakes, power steering and cast spoke or 10-hole disc wheels.	

AXLE, REAR

Capacity—lb.	18,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.50 or 7.17 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.50/8.87 or 7.17/9.77*

*7.17/9.77 ratio not recommended for tractor service.

BRAKES, SERVICE

Standard—Type	Vacuum-Power Operated, Hydraulic, Two-Shoe Front: Double Anchor. Rear: Two-Cylinder, Self-Energizing
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 2¼—0.25
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 5—0.50
Total Area (Lining)—sq. in.	488.6
Booster (Effective Diaphragm Dia.)—in.	10¼
Optional—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 2½—0.312
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	579.3
Compressor	7¼ cu. ft. per. min.
Air Reservoir Tanks	Two—830-cu. in. Cap'y each

BRAKE, HAND

Standard—Type	Drum and Contracting Band at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	10½ x 3—97.7
Optional—Type (with 6000 Series and R-46 Transmissions)	Internal Shoe
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—51
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number, Type	(99" & 111" wb.) One, Tubular, Forged-Steel Ends (135" & 153" wb.) Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	(99" & 111" wb.) Two, Needle Roller Bearing (135" & 153" wb.) Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control
	Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	226-hp 401 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.5 x 3.0 x 0.25
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.0 x 2.56 x 0.15
Section Modulus	14.93
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side

SHOCK ABSORBERS (Front)

Standard—Type	Double-Acting, Telescopic

SPRINGS

	Front	*Rear*	
Semi-Elliptic, Ford Alloy Steel		*Main*	*Auxiliary*
Length x Width—in.	57 x 3	56 x 3	37.5 x 3
Number of Leaves	9	10	7
Capacity at Spg. Pad (Norm. Defl.)—Per Spring	4000 lb.	7800 lb.	(combined)
Optional Spring Capacity		8700 lb.	(combined)

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller			
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1			
Wheelbase	99"	111"	135"	153"
Turning Circle Dia., Right or Left—ft.	37.9	41.1	47.7	52.6
Optional—Type	Master-Guide Power Steering			

TRANSMISSION

Standard	Spicer 4652 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 4756C 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.50 axle ratio and air brakes required)

Gear Positions Ratios (to 1):	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
4652 5-Speed Direct	7.40	4.00*	2.47*	1.46*	1.00*	7.84
4756C 5-Speed Direct	6.50	3.52*	1.93*	1.17*	1.00*	6.88
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09
R-46 8-Speed Roadranger	(9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)					

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 6.75
Tires—Number—Size	Six—10-22.5 10 PR

C-950 Specifications GVW 30,000 lb. • GCW 55,000 lb.

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs. Requires air brakes, power steering.	
Optional Axle Capacity—lb.	15,000
Includes 6,800-lb. front springs. Requires air brakes, power steering.	

AXLE, REAR

Capacity—lb.	21,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.50 or 7.17 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.50/8.87 or 7.17/9.77*

*7.17/9.77 ratio not recommended for tractor service.

BRAKES, SERVICE

Standard—Type	Vacuum-Power Operated, Hydraulic, Two-Shoe Front: Double Anchor. Rear: Two-Cylinder, Self-Energizing
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 2¼—0.25
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16 x 6—0.50
Total Area (Lining)—sq. in.	556.2
Booster (Effective Piston Dia.)—in.	9½
Optional—Type (w/9,000- or 11,000-lb. front axles)	Full-Air, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16¼ x 3½—0.44
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	650.0
Compressor	7¼ cu. ft. per min.
Air Reservoir Tanks	Two—1,150-cu. in. Cap'y each
Optional Compressor	12 cu. ft. per min.
Optional Full Air Brakes (w/15,000 front axle)	
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	17¼ x 3½—0.44
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.50
Total Area (Lining)—sq. in.	664.6

BRAKE, HAND

Standard—Type	Drum and Contracting Band at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	10½ x 3—97.7
Optional—Type (with 6000 Series and R-46 Transmissions)	Internal Shoe
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. In.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—51
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number, Type	(99" & 111" wb.) One, Tubular, Forged-Steel Ends (135" & 153" wb.) Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	(99" & 111" wb.) Two, Needle Roller Bearing (135" & 153" wb.) Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control
	Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	226-hp 401 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.28
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.03 x 0.25
Section Modulus	21.75
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side

SHOCK ABSORBERS (Front)

Standard—Type	Double-Acting, Telescopic

SPRINGS

	Front	*Rear*	
Semi-Elliptic, Ford Alloy Steel		*Main*	*Auxiliary*
Length x Width—in.	57 x 3	56 x 3	37.5 x 3
Number of Leaves	9	10	7
Capacity at Spg. Pad (Norm. Defl.)—Per Spring	4000 lb.	9250 lb.	(combined)
Optional Spring Capacity		10000 lb.	(combined)

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller			
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1			
Wheelbase	99"	111"	135"	153"
Turning Circle Dia., Right or Left—ft.	37.9	41.2	47.8	52.7
Optional—Type	Master-Guide Power Steering			

TRANSMISSION

Standard	Spicer 4652 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 4756C 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.50 axle ratio and air brakes required)

Gear Positions Ratios (to 1):	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
4652 5-Speed Direct	7.40	4.00*	2.47*	1.46*	1.00*	7.84
4756C 5-Speed Direct	6.50	3.52*	1.93*	1.17*	1.00*	6.88
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09
R-46 8-Speed Roadranger	(9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)					

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 7.5
Tires—Number—Size	Six—11-22.5 12 PR

C-1000 Specifications

GVW 31,000 lb. • GCW 55,000 lb. (Opt. GCW 65,000 lb.*)

**Requires 22,000-lb. rear axle*

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs. Requires power steering.	
Optional Axle Capacity—lb.	15,000
Includes 6,800-lb. front springs. Requires power steering.	

AXLE, REAR

Capacity—lb.	21,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.50 or 7.17 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.50/8.87
Optional Capacity—lb.	22,000
Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.17 or 6.67 to 1
Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.14/8.36 or 6.71/9.13

BRAKES, SERVICE

Standard—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thickness)—in.	16¼ x 3½—0.44
Rear Brake (Drum Dia. x Lining Width—Thickness)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	650.0
Compressor	7¼ cu. ft. per min.
Air Reservoir Tanks	Two—1,150-cu. in. Cap'y each
Optional Brakes (w/9,000- or 11,000-lb. Front and 22,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	718.2
Optional Brakes (w/15,000-lb. Front and 21,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	664.6
Optional Brakes (w/15,000-lb. Front and 22,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	732.8
Optional Compressor	12 cu. ft. per min.

BRAKE, HAND

Type	Internal Shoe at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—51
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number, Type	(99" & 111" wb.) One, Tubular, Forged-Steel Ends (135" & 153" wb.) Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	(99" & 111" wb.) Two, Needle Roller Bearing (135" & 153" wb.) Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control

Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	260-hp 477 Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.28
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.03 x 0.25
Section Modulus	21.75
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side

SHOCK ABSORBERS (Front)

Standard—Type	Double-Acting, Telescopic

SPRINGS

	Front	*Rear*	
Semi-Elliptic, Ford Alloy Steel		*Main*	*Auxiliary*
Length x Width—in.	57 x 3	56 x 3	37.5 x 3
Number of Leaves	9	10	9
Capacity at Spg. Pad (Norm. Defl.)—Per Spg.	4000 lb.	9650 lb.	(combined)
Optional Spring Capacity		10400 lb.	(combined)

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	99"	111"	135"	153"
Turning Circle Dia., Right or Left—ft.	37.7	41.0	47.6	52.5

Optional—Type	Master-Guide Power Steering

TRANSMISSION

Standard	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.17, 6.50 or 6.67 axle ratio required)

Gear Positions Ratios (to 1):	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09
R-46 8-Speed Roadranger	(9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01)					

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 7.5
Tires—Number—Size	Six—11-22.5 12 PR

C-1100 Specifications

GVW 31,000 lb. • GCW 65,000 lb. (Opt. GVW 36,000 lb.*)

**Requires 11,000-lb. front axle, 29,000-lb. rear axle, HD rear main springs and special frame*

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs. Requires power steering.	
Optional Axle Capacity—lb.	15,000
Includes 6,800-lb. front springs. Requires power steering.	

AXLE, REAR

Capacity—lb.	22,000
Standard—Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	6.17 or 6.67 to 1
Optional—Type	Two-Speed Planet—Full-Floating
Ratios (to 1)	6.14/8.36 or 6.71/9.13*
Optional Capacity—lb.	29,000**
Type	Double Reduction—Hypoid, Helical—Full-Floating
Axle Ratios	7.03 to 1
Type	Two-Speed Double Reduction—Full-Floating
Ratios (to 1)	6.42/8.38 or 7.09/9.07

*Not recommended for tractor service.
**With 6352 transmission only. Not available with 99" wb

BRAKES, SERVICE

Standard—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters, Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thick.)—in.	16¼ x 3½—0.44
Rear Brake (Drum Dia. x Lining Width—Thick.)—in.	16½ x 7—0.75
Total Area (Lining)—sq. in.	718.2
Compressor	7¼ cu. ft. per min
Air Reservoir Tanks	Two—1,150-cu. in. Cap'y each
Optional Brakes (w/15,000-lb. Front and 22,000-lb. or 29,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	732.8
Optional Compressor	12 cu. ft. per min.

BRAKE, HAND

Type	Internal Shoe at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—52
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	23—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number, Type	(99" & 111" wb.) One, Tubular, Forged-Steel Ends (135" & 153" wb.) Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	(99" & 111" wb.) Two, Needle Roller Bearing (135" & 153" wb.) Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control

Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	277-hp Super Duty V-8

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front and Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.28
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.03 x 0.25
Section Modulus	21.75
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side

SHOCK ABSORBERS (Front)

Standard—Type	Double-Acting, Telescopic

SPRINGS

	Front	*Rear*	
Semi-Elliptic, Ford Alloy Steel		*Main*	*Auxiliary*
Length x Width—in.	57 x 3	56 x 3	37.5 x 3
Number of Leaves	9	10	9
Capacity at Spg. Pad (Norm. Defl.)—Per Spg.	4000 lb.	9650 lb.	(combined)
Optional Spring Capacity		10400 lb.	(combined)

STEERING

Standard—Type	Worm and Dual Row Needle Bearing Roller
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	99"	111"	135"	153"
Turning Circle Dia., Right or Left—ft.	37.8	41.1	47.8	52.8

Optional—Type	Master-Guide Power Steering

TRANSMISSION

Standard	Spicer 6352 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6852G 5-Speed Synchro-Silent Direct-In-Fifth
Optional	Spicer 6453A 5-Speed Synchro-Silent Overdrive
Optional	8-Speed R-46 Roadranger (6.17 or 6.67 axle ratio required)

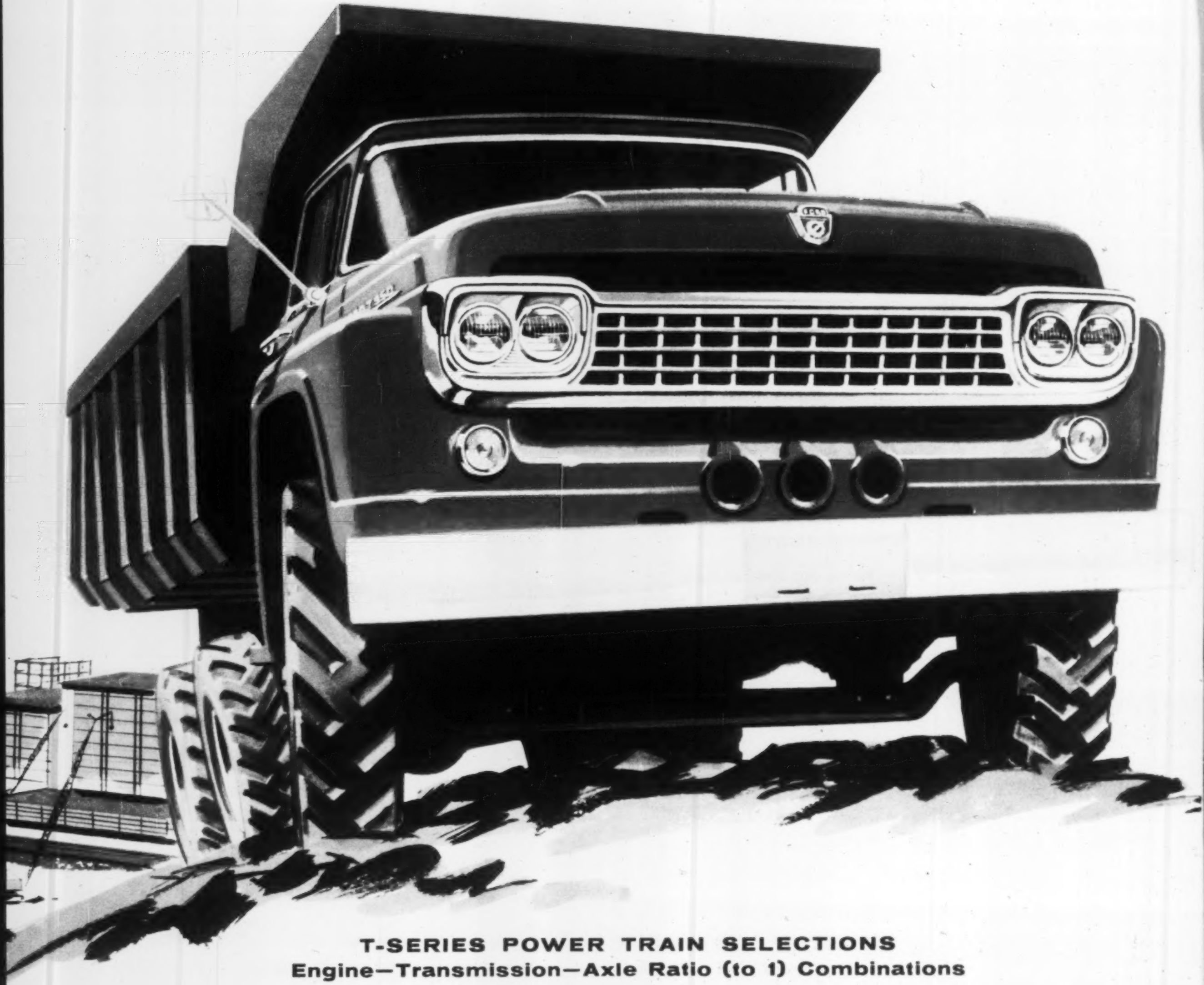
Gear Positions Ratios (to 1):	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33
6852G 5-Speed Direct	6.71	3.52*	1.97*	1.17*	1.00*	6.72
6453A 5-Speed Overdrive	6.07	3.40*	1.79*	1.00*	0.83*	6.09
R-46 8-Speed Roadranger	(9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.91)					

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Four—Cast Spoke
Rims—Number—Size	Seven—22.5 x 7.5
Tires—Number—Size	Six—11-22.5 12 PR



T-SERIES POWER TRAIN SELECTIONS

Engine—Transmission—Axle Ratio (to 1) Combinations

T-850

Transmission	401 SD V-8		477 SD V-8	534 SD V-8
	28,000-lb. axle	**34,000-lb. axle**	**34,000-lb. axle**	**34,000-lb. axle**
4652 w/o Aux.	7.07 or 7.79	7.80 or 8.60	—	—
4652 w/7231B	7.07 or 7.79	7.80 or 8.60	—	—
4652 w/7231D	7.07 or 7.79	7.80 or 8.60	—	—
6352 w/o Aux.	7.07 or 7.79	7.80 or 8.60	6.69 or 7.80	5.85, 6.69 or 7.80
6352 w/7231B	7.07 or 7.79	7.80 or 8.60	6.69 or 7.80	5.85, 6.69 or 7.80
6352 w/7231D	7.07 or 7.79	7.80 or 8.60	6.69 or 7.80	—
R-46	7.07 or 7.79	6.69 or 7.80	5.85, 6.69 or 7.80	5.85, 6.69 or 7.80

T-950

Transmission	401 SD V-8	477 SD V-8	534 SD V-8
	38,000-lb. axle	**38,000-lb. axle**	**38,000-lb. axle**
4652 w/o Aux.	7.60 or 8.38	—	—
4652 w/7231B	7.60 or 8.38	—	—
4652 w/7231D	7.60 or 8.38	—	—
6352 w/o Aux.	7.60 or 8.38	6.50, 7.60 or 8.38	5.57, 6.50, 7.60 or 8.38
6352 w/7231B	7.60 or 8.38	6.50, 7.60 or 8.38	5.57, 6.50, 7.60 or 8.38
6352 w/7231D	7.60 or 8.38	6.50, 7.60 or 8.38	6.50, 7.60 or 8.38
R-46	7.60	6.50 or 7.60	5.57 or 6.50

T-850 Specifications

GVW 43,000 lb. • GCW 70,000 lb. (Opt. GVW 37,000* or 45,000† lb.)—(Opt. GCW 55,000 lb.*)

**Requires 28,000-lb. rear axle, 9,000-lb. front axle and 401 SD V-8*

†Requires 34,000-lb. rear axle, 11,000-lb., or 15,000-lb. front axle, air brakes and maximum size wheels and tires

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000*
Includes 5,000-lb. front springs.	
Optional Axle Capacity—lb.	15,000*
Includes 6,800-lb. front springs.	*w/45,000-lb. GVW package only.

AXLE, REAR

Capacity—lb.	34,000
Type	Single Reduction—Spiral Bevel—Full-Floating
Axle Ratios	(w/401 V-8) 6.69,* 7.80 or 8.60 to 1
Optional Ratios	(w/477 V-8) 5.85,* 6.69** or 7.80 to 1 (w/534 V-8) 5.85,** 6.69** or 7.80 to 1

*Available only with R-46 transmission and air brakes.
**Available only with air brakes.

Optional Capacity—lb.	28,000
Axle Ratios	(w/401 V-8) 7.07 or 7.79 to 1 (includes 9-22.5 10 PR tires on 6.75 rims)

BRAKES, SERVICE

Standard—Type	Vacuum-Power Operated, Hydraulic, Two-Shoe
Front Brake (Drum Dia. x Lining Width—Thick.)—in.	16 x 2¼—0.25
Rear Brake (Drum Dia. x Lining Width—Thick.)—in.	16 x 5—0.50
Total Area (Lining)—sq. in.	807.6
Booster (Effective Dia.)—in.	9.5
Optional Vacuum-Hydraulic Brakes (w/28,000-lb. Rear Axle)	
Total Area (Lining)—sq. in.	765.6
Optional—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters: Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Compressor	7¼ cu. ft. per min.
Air Reserve Tanks	Three—830-cu. in. Cap'y each:
Optional Full-Air Brakes (w/9,000-lb. front and 28,000-lb. rear)	
Total Area (Lining)—sq. in.	767.7
Optional—Full-Air Brakes (w/9,000- or 11,000-lb. front & 34,000-lb. rear)	
Total Area (Lining)—sq. in.	904.7
Optional Full-Air Brakes (w/15,000-lb. front and 34,000-lb. rear axles)	
Total Area (Lining)—sq. in.	1006.8
Optional Compressor	12 cu. ft. per min.

BRAKE, HAND

Standard—Type	Drum and Contracting Band at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	11½ x 4—142.7
Optional Type (with R-46, 6,000 and 7,000 Series Transmissions)	Internal Shoe
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—46 (47 with 534 SD V-8)
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21 (23 with 534 SD V-8)—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number	Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control

Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key Lock; Circuit Breakers; Rectifier

ENGINE

Standard	226-hp 401 Super Duty V-8
Optional	260-hp 477 Super Duty V-8†
Optional	277-hp 534 Super Duty V-8†

†Optional main transmission required.

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front, Full-Depth Rear
Max. Section (Depth x Flange x Thick.)—in.	9.75 x 3.50 x 0.375
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.00 x 3.125 x 0.15
Section Modulus	22.06
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks (except 144" wb.); 100-gal. Step Tanks, with air brakes only; 60-gal. Cylindrical Tank for Right and/or Left Side. (Cylindrical not avail. on 144" and 156" wb.)

SPRINGS

	Front	*Rear*
Semi-Elliptic, Ford Alloy Steel		
Length x Width—in.	52 x 3	34 x 4
Number of Leaves	8	12
Capacity at Spg. Pad (Norm. Defl.)—Per Spg.	4000 lb.	15500 lb.

STEERING

Standard—Type	Master-Guide Power Steering
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	144"	156"	175"	192"
Turning Circle Dia., Right or Left—ft.	49.4	52.7	58.0	62.6

TRANSMISSION

Gear Positions	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
Ratios (to 1):						
Standard 4652 5-Speed Direct	7.40	4.00*	2.47*	1.46*	1.00*	7.84
Optional 6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33

Optional R-46 8-Speed Roadranger.. (9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01) (Axle ratios required: 5.85, 6.69, 7.80, 7.79 or 7.07. Not available with auxiliary transmission.)

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

TRANSMISSION, AUXILIARY (except 144" wb.)

Gear Positions	*Overdrive*	*Underdrive*	*Direct*
Ratios (to 1):			
Optional Spicer 7231B 3-Speed	0.86	1.24	1.00
Optional Spicer 7231D* 3-Speed	0.86	2.14	1.00

*Not available with 534 SD V-8.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Six—Cast Spoke
Rims—Number—Size	Eleven—22.5 x 6.75
Tires—Number—Size	Ten—10-22.5 10 PR

T-950 Specifications

GVW 46,000 lb. • GCW 75,000 lb. (Opt. GVW 48,000* or 51,000† lb.)

**Requires 11,000-lb. front axle*

†Requires 15,000-lb. front axle

AXLE, FRONT

Standard Axle Capacity—lb.	9,000
Optional Axle Capacity—lb.	11,000
Includes 5,000-lb. front springs.	
Optional Axle Capacity—lb.	15,000
Includes 6,800-lb. front springs.	

AXLE, REAR

Capacity—lb.	38,000
Type	Single Speed—Spiral Bevel—Full-Floating
Axle Ratios	(w/401 V-8) 7.60 or 8.38 to 1
Optional Ratios	(w/477 V-8) 6.50, 7.60 or 8.38 to 1 (w/534 V-8) 5.57,* 6.50, 7.60 or 8.38 to 1

*Not used in combination w/7231D auxiliary transmission.

BRAKES, SERVICE

Standard—Type	Full-Air, Heavy-Duty Two-Shoe with Slack Adjusters: Air Gauge on Instrument Panel, Air Windshield Wipers and Air Warning Buzzer
Front Brake (Drum Dia. x Lining Width—Thick.)—in.	16¼ x 3½—0.312
Rear Brake (Drum Dia. x Lining Width—Thick.)—in.	16½ x 6—0.75
Total Area (Lining)—sq. in.	1061.8
Compressor	7¼ cu. ft. per min.
Air-Reservoir Tanks	One—1275-cu. in.; Two—1395-cu. in. Cap'y each
Optional Compressor	12 cu. ft. per min.
Optional Brakes—(w/15,000-lb. Front and 38,000-lb. Rear Axles)	
Total Area (Lining)—sq. in.	1076.4

BRAKE, HAND

Standard—Type	Drum and Contracting Band at Rear of Transmission on Drive Line
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	11½ x 4—142.7
Optional—Type (with R-46, 6,000 and 7,000 Series Transmissions)	Internal Shoe
Size (Drum Dia. x Lining Width, in.—Lining Area, sq. in.)	12 x 4—111.6

CLUTCH

Type	Hydraulically Operated, 13-in., Constant Pressure Two-Plate
Total Frictional Area—sq. in.	378

COOLING SYSTEM

Type—Capacity—qt.	Three-Stage—46 (47 with 534 SD V-8)
Thermostats	Two, in Intake Manifold
Fan, Diameter—in.	21 (23 with 534 SD V-8)—5-Blade

DRIVE LINE

Type	Hotchkiss, Straight-Line Drive
Propeller Shafts—Number	Two, Tubular, Forged-Steel Ends
Universal Joints—Number, Type	Three, Needle Roller Bearing
Center Bearing	Rubber-Encased Ball Type

ELECTRICAL SYSTEM

Battery	12-Volt, 78-Plate, 70 Amp-Hr
Alternator	50 Amp., 750 Watts
Headlights	Dual Sealed-Beam, Foot-Switch Beam Control
Starter	High Torque, Ignition Key Starter Control

Parking Lights; Left Combination Stop and Taillight; Instrument Lights; Ignition Switch with Key-Lock; Circuit Breakers; Rectifier

ENGINE

Standard	226-hp 401 Super Duty V-8
Optional	260-hp 477 Super Duty V-8‡
Optional	277-hp 534 Super Duty V-8‡

‡Optional main transmission required.

FRAME

Side Rails—Type	Parallel, Channel Section—Tapered Front, Full-Depth Rear
Max. Section (Depth x Flange x Thick.)—in.	9.95 x 3.50 x 0.375
Reinforcement	Channel, Inside Side Rail
Max. Section (Depth x Flange x Thick.)—in.	9.20 x 3.125 x 0.25
Section Modulus	25.65
Cross Members—Type	Flanged "U" Type with Alligator Jaw or Channel Type

FUEL TANK (All Tanks include Electric Fuel Pumps)

18-gallon	Frame-Mounted, Left Side
Optional	125-gal. Saddle Tanks; 100-gal. Step Tanks; 60-gal. Cylindrical Tank for Right and/or Left Side. (Cylindrical not avail. on 156" wb.)

SPRINGS

	Front	*Rear*
Semi-Elliptic, Ford Alloy Steel		
Length x Width—in.	52 x 3	34 x 4
Number of Leaves	8	12
Capacity at Spg. Pad (Norm. Defl.)—Per Spg.	4000 lb.	15500 lb.

STEERING

Standard—Type	Master-Guide Power Steering
Wheel—Over-all Ratio	20-in. Dia., 3-Spoke—24.4 to 1

Wheelbase	156"	175"	192"
Turning Circle Dia., Right or Left—ft.	52.7	57.9	62.6

TRANSMISSION

Gear Positions	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Reverse*
Ratios (to 1):						
Standard 4652 5-Speed Direct	7.40	4.00*	2.47*	1.46*	1.00*	7.84
Optional 6352 5-Speed Direct	7.31	4.09*	2.41*	1.44*	1.00*	7.33

Optional R-46 8-Speed Roadranger. (9.78, 6.98, 4.99, 3.68, 2.66, 1.90, 1.36, 1.00, rev. 11.01) (Axle ratios required: 7.60 w/401 V-8, 6.50 or 7.60 w/477 V-8 and 5.57 or 6.50 w/534 V-8. Not available with auxiliary transmission.)

Power Take-Off Opening	SAE 6-Bolt, On Both Sides

*Synchronized Speeds.

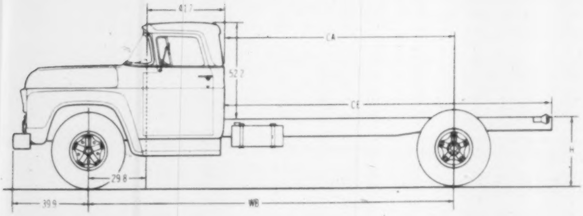
TRANSMISSION, AUXILIARY

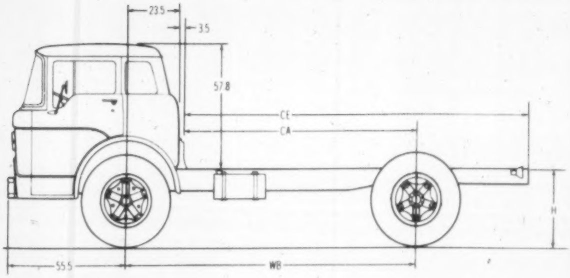
Gear Positions	*Overdrive*	*Underdrive*	*Direct*
Ratios (to 1):			
Optional Spicer 7231B 3-Speed	0.86	1.24	1.00
Optional Spicer 7231D* 3-Speed	0.86	2.14	1.00

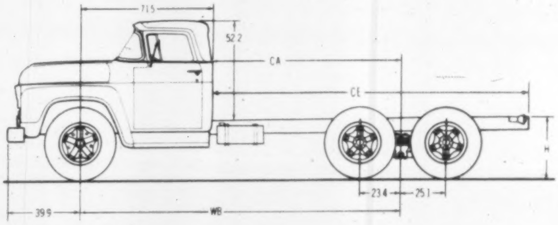
*Not available in combination with 534 SD V-8 and 5.57 axle ratio.

WHEELS AND TIRES (Standard)

Wheels—Number—Type	Six—Cast Spoke
Rims—Number—Size	Eleven—22.5 x 7.5
Tires—Number—Size	Ten—11-22.5 12 PR







DIMENSIONS AND CHASSIS WEIGHTS

MODEL	WB (in.)	CA (in.)	CE (in.)	Nom. Body Lengths(ft.)	Curb Weights* (lb.) Front	Rear	Total
					10-22.5 10 PR Tires		
F-850 **GVW 25,000 lb.**	132	60.5	111.7	7½-9	3995	2930	6925
	144	72.5	123.7	9-11	4010	2950	6960
	156	84.5	135.7	10-13	4035	3000	7035
	175	103.5	163.5	13-16	4065	3065	7130
	192	120.5	180.5	15-19	4175	3035	7210
					11-22.5 12 PR Tires		
F-950 **GVW 29,000 lb.**	132	60.5	111.7	7½-9	4285	3255	7540
	144	72.5	123.7	9-11	4320	3285	7605
	156	84.5	135.7	10-13	4365	3335	7700
	175	103.5	163.5	13-16	4420	3390	7810
	192	120.5	180.5	15-19	4460	3425	7885
					11-22.5 12 PR Tires		
F-1000 **GVW 30,000 lb.**	132	60.5	111.7	7½-9	4340	3530	7870
	144	72.5	123.7	9-11	4375	3565	7940
	156	84.5	135.7	10-13	4420	3610	8030
	175	103.5	163.5	13-16	4475	3665	8140
	192	120.5	180.5	15-19	4510	3700	8210
					11-22.5 12 PR Tires		
F-1100 **GVW 30,000 lb.** **OPT. GVW 36,000 lb.**	132	60.5	111.7	7½-9	4345	3700	8045
	144	72.5	123.7	9-11	4380	3735	8115
	156	84.5	135.7	10-13	4425	3780	8205
	175	103.5	163.5	13-16	4480	3835	8315
	192	120.5	180.5	15-19	4520	3875	8395
					10-22.5 10 PR Tires		
C-850 **GVW 26,000 lb.**	99	72	123.2	9-11	5030	2335	7365
	111	84	135.2	10-13	5040	2355	7395
	135	108	168.0	13-16	5135	2410	7545
	153	126	186.0	16-20	5175	2450	7625
					11-22.5 12 PR Tires		
C-950 **GVW 30,000 lb.**	99	72	123.2	9-11	5205	2775	7980
	111	84	135.2	10-13	5225	2805	8030
	135	108	168.0	13-16	5320	2880	8200
	153	126	186.0	16-20	5375	2935	8310
					11-22.5 12 PR Tires		
C-1000 **GVW 31,000 lb.**	99	72	123.2	9-11	5465	3025	8490
	111	84	135.2	10-13	5495	3050	8545
	135	108	168.0	13-16	5560	3095	8655
	153	126	186.0	16-20	5610	3125	8735
					11-22.5 12 PR Tires		
C-1100 **GVW 31,000 lb.** **OPT. GVW 36,000 lb.**	99	72	123.2	9-11	5465	3195	8660
	111	84	135.2	10-13	5495	3220	8715
	135	108	168.0	13-16	5560	3265	8825
	153	126	186.0	16-20	5610	3295	8905
					10-22.5 10 PR Tires		
T-850 **GVW 43,000 lb.** **OPT. GVW 45,000 lb.** **OPT. GVW 37,000 lb.**	144	72.5	128.5	10-11	4100	6020	10120
	156	84.5	144.5	11-13	4140	6055	10195
	175	103.5	175.5	13-16	4210	6105	10315
	192	120.5	204.5	15-19	4275	6155	10430
					11-22.5 12 PR Tires		
T-950 **GVW 46,000 lb.** **OPT. GVW 48,000 lb.** **OPT. GVW 51,000 lb.**	156	84.5	144.5	11-13	4670	6735	11405
	175	103.5	175.5	13-16	4795	6860	11655
	192	120.5	204.5	15-19	4840	6905	11745

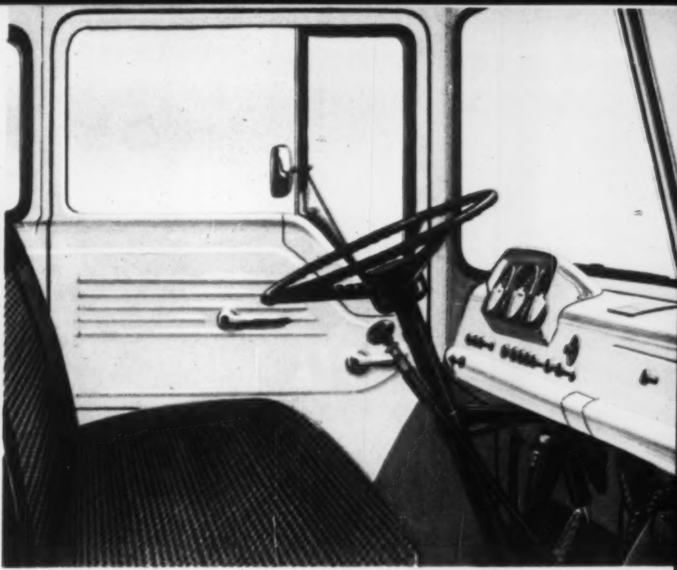
FRAME HEIGHT AT REAR AXLE

SERIES	TIRE SIZE	H (in.) Empty	Loaded
F-850	10-22.5 10 PR	36.0	33.0
	11-22.5 12 PR	36.6	33.6
F-950 thru F-1100	11-22.5 12 PR	36.2	33.7
	11-24.5 12 PR	37.2	34.7
	12-22.5 12 or 14 PR	36.9	34.4
	12-24.5 12 PR	37.9	35.4
C-850	10-22.5 10 PR	35.1	32.9
	11-22.5 12 PR	35.7	33.5
C-950 thru C-1100	11-22.5 12 PR	36.1	33.7
	11-24.5 12 PR	37.1	34.7
	12-22.5 12 or 14 PR	36.8	34.4
	12-24.5 12 PR	37.8	35.4
T-850	10-22.5 10 PR	38.7	37.7
	11-22.5 12 PR	39.3	38.3
T-950	11-22.5 12 PR	40.3	39.3
	11-24.5 12 PR	41.3	39.3
	12-22.5 12 or 14 PR	41.0	40.0
	12-24.5 12 PR	42.0	41.0

OPTIONAL EQUIPMENT ADD WEIGHTS

		Front	Rear	Total
Axle, Front—11,000 lb.				
F-850		110	0	110
F-950, F-1000, F-1100, T-850, T-950		90	0	90
C-850, C-950		115	0	115
C-1000		80	0	80
C-1100		105	0	105
Axle, Front—15,000 lb.				
F-1000, F-1100		280	0	280
C-950		250	0	250
C-1000		330	0	330
C-1100		360	0	360
T-850, T-950		380	0	380
Axle, Rear—Single-Speed				
F-C-1000—22,000 lb.		0	90	90
F-C-1100—29,000 lb.		0	225	225
Axle, Rear—Two-Speed				
F-C-850—18,000 lb.		0	125	125
F-C-950, F-C-1000—21,000 lb.		0	25	25
F-C-1000—22,000 lb.		0	150	150
F-C-1100—29,000 lb.		0	325	325
Axle, Rear—Tandem				
T-850—28,000 lb.		0	345†	345†
Brakes, Full Air				
F-850, C-850		95	205	300
F-950, C-950		90	165	255
T-850		120	405	525
Power Steering (F- & C-Series)		100	0	100
Transmission—8000 Series				
F-850, F-950		110	35	145
T-850		65	20	85
T-950		95	30	125
Transmission—Roadranger				
F-850, F-950		195	40	235
F-1000, F-1100		75	15	90
C-850, C-950		185	100	285
C-1000, C-1100		60	25	85
T-850 (over 4000 Series)		195	35	230
T-950 (over 4000 Series)		170	40	210
Tires, Tubeless				
F-C-850	11-22.5 12 PR (7.5)	66	140	206
F-C-950 thru 1100				
	11-24.5 12 PR (8.25)	58	134	192
	12-22.5 12 PR (8.25)	46	103	149
	12-24.5 12 PR (8.25)	76	170	246
	12-22.5 14 PR (8.25)	68	147	215
T-850	11-22.5 12 PR (7.5)	66	273	339
T-950	11-24.5 12 PR (8.25)	58	250	308
	12-22.5 12 PR (8.25)	46	195	241
	12-24.5 12 PR (8.25)	76	322	398
	12-22.5 14 PR (8.25)	68	272	340

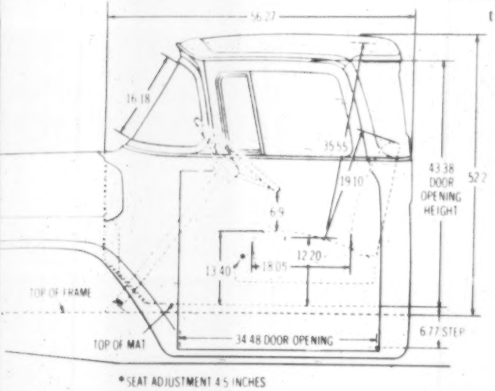
**All weights are estimated. Curb weights include standard cab and equipment, full tank of fuel, oil and lubricants. For Chassis-Cowl deduct 395 lb. "Front," 175 lb. "Rear" and 570 lb. "Total."* *†Deduct.*

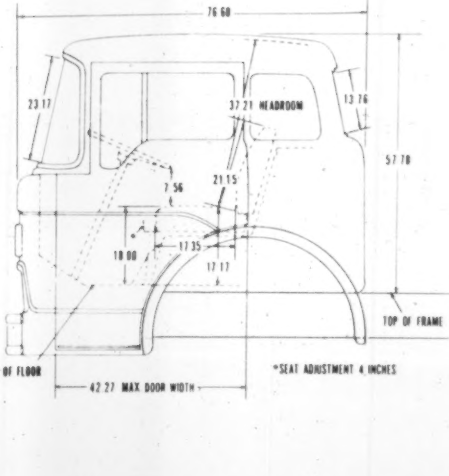


FORD Driverized Cabs

GREATEST CAB LUXURY AND VALUE—FORD'S CUSTOM CAB—

Conventional and Tilt (shown above) Add to Ford's standard cab features all these custom "extras," and you'll see why the Custom Cab is worth its small additional cost!





- Two-tone woven nylon-saran brown and white hound's-tooth pattern seat upholstery
- Foam-rubber padding in seat cushion
- Foam-rubber padding in seat back (driver's section, Tilt Cab)
- Thermacoustic headlining backed by one-half inch of glass wool insulation
- Sound deadener on floor and rear cab panel
- Insulation on cowl wall in cab (Conventional Cab)
- Attractive hardboard door and cowl-side trim panels (Conventional Cab)
- Arm rest on left door (Conventional Cab)
- Fold-down arm rest on driver's side (Tilt Cab)
- Large dome light with manual switch
- Sun visor on right side
- Illuminated cigar-cigarette lighter
- Bright-metal grille and hooded headlight assembly (Conventional Cab)
- Bright-metal windshield reveal molding
- Bright-metal parking light rims (Standard Tilt Cab)
- "Custom Cab" emblem on each door
- Matched locks on both doors

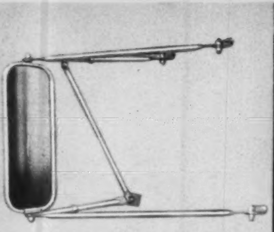
STANDARD CAB EQUIPMENT

(In addition to items listed on specification pages)

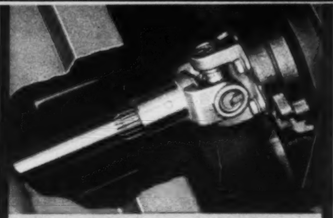
- Air Wing Ventilators in Doors
- Ammeter
- Ash Receptacle
- Cab All-Weather Ventilation (C-Series)
- Channel Front Bumper
- Choke Control
- Differential Lockout Control with Warning Light (T-Series)
- Dispatch Box
- Door Lock, Right Side
- Fuel Gauge
- Full-Wrap Windshield
- Hand Throttle
- Hi-Dri Cowl Ventilator (F- and T-Series)
- Horns, Twin Electric
- Inboard Cab Step
- Instrument Panel
- Light Switch
- Mirror, Rearview, Outside Left
- Oil Pressure Gauge
- Running Boards (F- and T-Series)
- Speedometer
- Sun Visor, Left Side
- Tachometer
- Tools
- Water Temperature Gauge
- Windshield Wipers, Dual Electric —Air on Air-Equipped Chassis

STANDARD COLORS

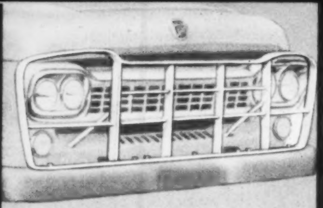
Choice of Vermilion, Midnight Blue, Azure Blue, Gunmetal Gray, Raven Black, Colonial White, Meadow Green, Seaspray Green, Goldenrod Yellow or Prime (F- and T-Series: on hood, fenders, cowl, cab, interior metal, inboard cab step, running boards and fuel filler cap. Any of the above colors can be combined with Colonial White for a smart Two Tone effect on the cab). (C-Series: on cab, interior metal, and inboard cab step.) Painted Raven Black are frame, door vent frame and glass channel, fuel tank, taillight, springs, axles, and wheels. Painted Colonial White are bumper, grille, dual headlight assembly, parking light rims and outside rearview mirror. Headlights and parking light rims are bright-metal on C-Series.



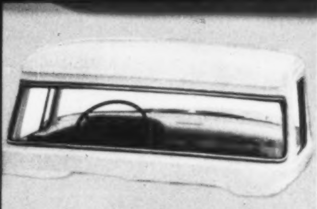
Full-view mirror (Western type) has a large 6 x 16 inch reflecting surface for maximum side and rear visibility. Adjustable arms and mirror.



Front-end power take-off for front-mounted pump, etc. Power take-off unit consisting of damper assembly and jack shaft available on Ford F- and T-Series.



Heavy-duty grille guard is braced to truck frame for grille, radiator and headlight protection. Rugged bar steel construction. Tow hooks also available.



Full-wrap rear window provides wide-angle visibility. Over 766 sq. in. available on F- & T-Series for Standard or Custom Cabs. Bright-metal molding around window.

FORD Accessories and Optional Equipment in addition to those previously shown:

REGULAR PRODUCTION OPTIONS

Air Horns, on air equipped models
Arm Rest, Left (Standard Cab)
Cab, Custom
Carrier, Spare Wheel
Heater and Defroster, MagicAire or Recirculating
Hydraulic Jack, 5-ton (F- & C-850), 8-ton (F- & C-950, 1000 & 1100; T-850 & 950)
Padded Instrument Panel and Cushioned Visors
Radio
Spare Tire, Tubeless
Sun Visor, right side (Standard Cab)
Tinted Glass
Tube-Type Tires
Turn Signals, Front & Rear
Windshield Washers
Wheels & Tires (Tubeless)

F- & C-850

(7) 22.5 x 7.5 Rims
(7) 22.5 x 7.5 Disc Wheels, 8-hole or 10-hole type
(6) 11-22.5 12 PR Tires*

*Heavy Duty rear springs and 7.5 rims or wheels required.

F- & C-950, 1000 & 1100

(7) 22.5 x 8.25 Rims
(7) 24.5 x 8.25 Rims
(7) 22.5 x 7.5 Disc Wheels, 10-hole
(7) 22.5 x 8.25 Disc Wheels, 10-hole
(7) 24.5 x 8.25 Disc Wheels, 10-hole
(6) 11-24.5 12 PR Tires*
(6) 12-22.5 12 PR Tires*
(6) 12-24.5 12 PR Tires*
(6) 12-22.5 14 PR Tires*

*Heavy Duty rear springs and 8.25 rims or wheels required.

T-850

(11) 22.5 x 7.5* Rims
(11) 22.5 x 6.75** Disc Wheels, 8-hole
(11) 22.5 x 7.5* Disc Wheels, 8-hole
(11) 22.5 x 7.5† Disc Wheels, 10-hole
(10) 10-22.5 10 PR Tires**
(10) 11-22.5 12 PR Tires*‡

*For highway operation only if used with 28,000-lb. axle.
**With 28,000-lb. axle only.
†With 34,000-lb. axle only.
‡22.5 x 7.5 rims or disc wheels required.

T-950

(11) 22.5 x 8.25 Rims
(11) 24.5 x 8.25 Rims
(11) 22.5 x 7.5 Disc Wheels, 10-hole
(11) 22.5 x 8.25 Disc Wheels, 10-hole
(11) 24.5 x 8.25 Disc Wheels, 10-hole
(10) 11-24.5 12 PR Tires*
(10) 12-22.5 12 PR Tires*
(10) 12-24.5 12 PR Tires*
(10) 12-22.5 14 PR Tires*

*8.25 rims or wheels required.

PRE-APPROVED OPTIONS

Arm Rest, Right Side for All Cabs
Cigar Lighter (Standard Cab)
Dome Light (Standard Cab)
Generator, Ford, 40 amp., 600 watts
Generator, 50 amp., 750 watt (T-850, T-950)
ICC Clearance Lights
Mirrors: Inside Safety;
Outside—Right, Non-Telescopic;
Left or Right, Telescopic (except C-Series)
Shock Absorbers, front (Std. on C-Series)
Spare Tire, Tube-type
Taillight, Right
Turn Signals, front only
Vacuum Reserve Tank, 1,000 cu. in. (F- & C-850, 950)

ACCESSORIES—DEALER INSTALLED

Fire Extinguisher
Locking Gas Tank Cap
Reflector Flares (3 in Kit) with Flags
Seat Belts
Seat Covers
Seat Cushion, Ventilated
Shaver, Electric
Splash Guards

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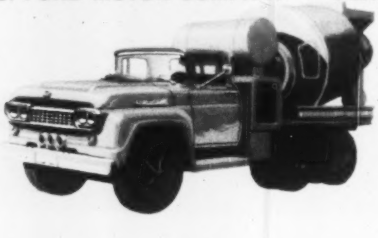

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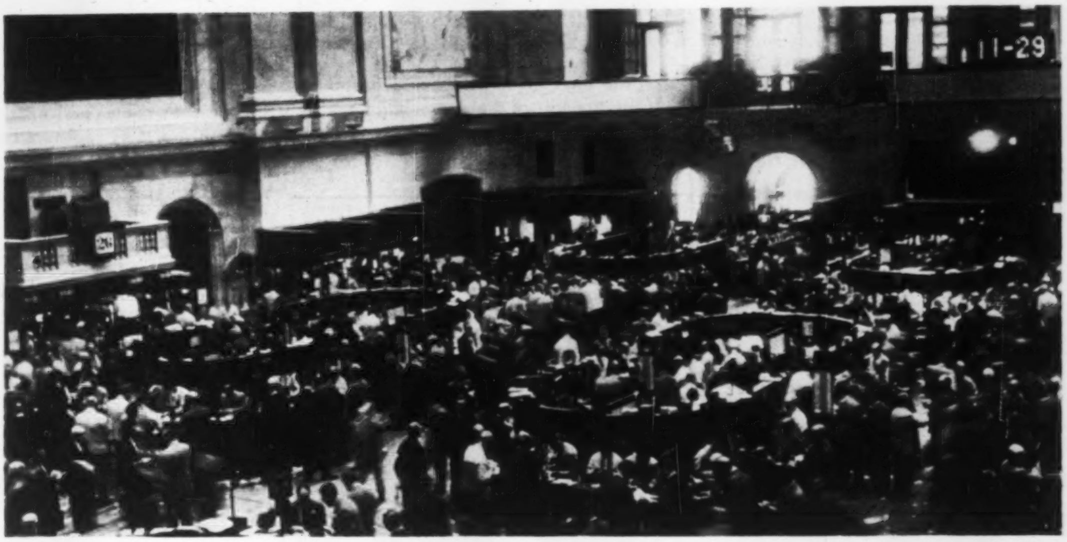


THE NATION'S MONEY MARKET last year was as fast and hectic as the action on the floor of the New York Stock Exchange, with interest rates soaring but declining before year-end.

Easier Money Favors Construction In 1958

Construction money will be cheaper, and easier to come by, in 1958. A marked easing in long-term capital markets has been under way since last fall, and it is expected to continue through most of this year. But the outlook for the next several years is still for interest rates higher than pre-1956 levels (see charts next page).

These are the main conclusions of the studies recently made by experts in capital market conditions. They foresee a small decrease in over-all demand for long-term funds, as compared with 1957, and ample new investment funds coming into the market to meet the demand.

There were some signs of slackening in demand for funds earlier, but the signal for the shift away from tight money was the cut in the Federal Reserve discount rate last November. This was immediately reflected in corporate bond prices. A second cut in discount rates in January, followed promptly by cuts in prime rates by leading banks, spurred another decline in interest rates.

Government measures to ease credit—by federal lending agencies as well as the Federal Reserve Board—are prompted by the decline in business. But Girard L. Spencer, of the New York Stock Exchange firm of Salomon Bros. & Hutzler, expects the money market loosening to continue even if business should turn up by mid-year.

"The record shows," Mr. Spencer notes, "that there is usually a lag in the effect that changes in the economy have on the securities' markets, as well as to a certain extent on current Federal Reserve monetary policy."

(*Continued on page 94*) →

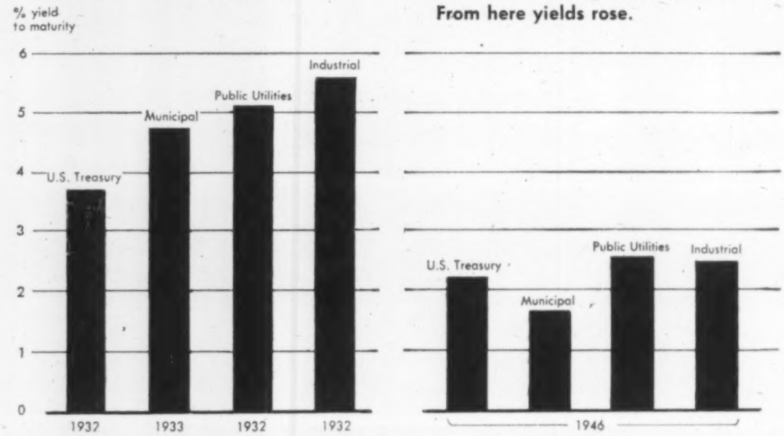
Paths and Directions of Long

➡

The long term money market has had sharp up and down moves in the last 25 to 26 years with the highest peaks and lowest valleys reached in 1932-46 period. These borrowing costs have had their influence on construction costs.

The high mark was scored in the early years of the depression from which point yields declined.

The decline was steady and in some of the years, precipitous, with the lows registered in 1946. From here yields rose.



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. . . Project financing will ease this year

For the rest of 1958 he expects that "interest rates will move lower in the months ahead, and although they may stabilize later, it is improbable that they will advance significantly."

A key feature of capital market activity this year will be the offering of new securities in large volume by borrowers who have been holding back for a drop in interest rates. A huge backlog of municipal issues, for instance, had piled up because of last year's forbidding rates. This will give a lift to construction where projects had been held up for financing.

Two other movements into long-term markets, however, won't have this effect. The U.S. Treasury and many corporations, which have borrowed heavily on a short-term basis over the last two years, are seizing the opportunity presented by the break in interest rates to convert short-term notes and loans into long-term bonds. These shifts do not provide any basis for new construction. Indeed, they will help sustain interest rates on long-term capital.

The sources of long-term funds are expected by Salomon Bros. & Hutzler to supply $21.9 billion this year, against $21.5 billion in 1957.

Source of Funds	1957	1958
	($ billion)	
Life Insurance Companies	5.0	4.6
Fire & Casualty Insurance	0.4	1.0
Mutual Savings Banks	1.9	1.8
Savings & Loan Assns.	4.9	4.9
Pension Funds	4.1	4.4
Other	5.2	5.2
Total	21.5	21.9

Mr. Spencer, who prepares these estimates, expects total demand for long-term funds to drop from about $23.9 billion last year to $21.4 billion in 1958. This would indicate an actual surplus of long-term funds. By contrast, in recent years, commercial banks have had to make up a deficiency.

Mortgage financing, he expects, will require slightly more new financing—$10.2 billion against $10.1 billion last year—on the basis of a rise to 1,050,000 private housing starts.

State, municipal and public revenue authority financing will rise, but the drain on long-term funds may decline—from $4.1 billion to $3.4 billion. The reason is that commercial banks, which took virtually no municipals last year, are expected to buy about $1 billion this year. (Commercial bank transactions are excluded from Mr. Spencer's analysis.)

Corporate financing (including foreign and international bank borrowings in U.S. dollars) will decline. Mr. Spencer puts the drop at almost $2 billion—$9.7 billion to $7.8 billion. But the shift from bank loans to long-term issues, mentioned earlier, is expected by other experts to keep the drop narrower.

Estimates made on a somewhat different basis by the Economics Department of the Bankers Trust Co., which will be released later, will probably be similar to Mr. Spencer's.

Another analysis of the capital market has been published for the first time this year by R. W. Pressprich & Co., members of the New York Stock Exchange. Concentrating on the first six months of the year, it declares that "the immediate outlook for money rates is lower, giving borrowers excellent opportunities to obtain capital at better terms than in 1957."

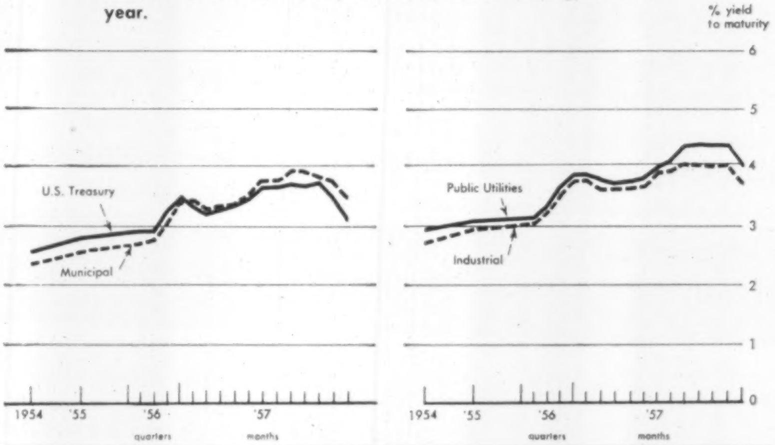
• **A record year, but**—Last year's economic cross currents and undercurrents became readily apparent with the release of statistics by governmental and industrial groups. Sales and earnings figures of individual industries also reflected the trend. Many companies showed sales and earnings on the down side and a few reported higher sales volume but lower earnings. And it is the latter phenomenon that highlights the squeeze of inflation on profits. It was also one that hit at construction, as was amply illustrated by the 1957 construction outlays report issued by the U.S. Departments of Commerce and Labor.

For the 12 months, expenditures for new construction established a new record for dollar volume. But the $47.3 billion total, which represented a 3% dollar gain over 1956, was not equal to any gain in physical volume of construction put in place. It remained about the same as 1956's physical volume. The dollar rise merely reflected higher costs.

• **Housing spotlighted**—It was a dramatic, but disappointing year for housing. Congress voted to lower the down-payment requirements for houses

Term Loan Costs

From 1954 into 1957 the climb was steep, faltering on brief occasions, but leaving little doubt as to the upward trend. Late last year, yields stumbled, with the decline continuing into this year.



bought and financed with a mortgage insured by the Federal Housing Administration. But this move that was supposed to have stimulated home sales was defeated in its purpose by stipulation of maximum discounts allowable. This section of the legislation set limits that lenders could charge on the mortgages accepted and immediately drew the fire of the housing and lending groups as well as Albert M. Cole, U. S. housing administrator, and Norman P. Mason, FHA head.

Both government officials have strongly recommended that the controls be removed.

• Builders' plans shift—The two-year housing decline has resulted in a marked change in builders' thinking. Engrossed in building larger and more expensive houses, the industry generally deserted the low cost field. But a return to that market is promised this year and emphasis will be placed on the $10,000 to $12,000 bracket. In some sections, the drive will be toward homes costing less than $10,000.

George S. Goodyear, who recently left office as president of NAHB, said that members of the organization are prepared to construct 150,000 to 200,000 low cost houses this year, provided that lenders supply enough financing at favorable terms.

• Apartments interest lenders—George W. Warnecke, New York City mortgage broker, reports that apartment construction leads the field in interest to larger banks and insurance companies.

• Capehart housing—This program, aimed at providing privately financed family housing for military personnel, was hindered last year by the tightness in the mortgage money and the low interest rate of 4% set by law. Because of the money market, the program was greatly dependent upon mortgage financing by Fannie Mae. But the $416 million authorized for Capehart housing has dwindled to $97 million, an amount that is sufficient for approximately 6,300 units.

With the loosening of the money market in general, funds from investors will probably become more readily available and perhaps at less than the allowable four point discount.

The Defense Department's housing office, however, is not banking fully on the mortgage market for it is now working on a plan for a new housing corporation that could raise funds in the private market to build the needed projects. Government officials hope the plan will be completed in time to present to the current session of Congress for action.

• Lease-purchase revived—This federal building program that never got far off the ground was allowed to expire in Congress last year. But already approved were 97 projects having an estimated building cost of $700 million.

Efforts were made late last year by the General Services Administration to get some jobs started and to that end the agency dumped the 4% interest rate ceiling on the financing phase of the program.

Put out for financial bidding were eight projects, but bids were received on only five of them with interest rates ranging from 4.74% to 5%. Then last month financing bids were invited for six projects having an estimated cost of $16.2 million. Coming well after the downturn in interest rates generally, the bidding was active and the rates ranged from 4.67% to 4.84%.

The enthusiasm was obvious, but the biggest hurdle anticipated was construction bidding. Could contractors stay within the original cost estimates? On the basis of bids received during the latter part of last month, it appears this will be possible. Eleven bidders tendered offers on the only project up for bid, the estimated $5.8 million federal office building in Albuquerque, N. M. The bids ranged from 23% to 31% below the estimate.

If this opening indicates a trend, chances are good that 20 more projects will be advertised during the next few months.

• High cost of Sputnik—Before the appearance of the Russian satellite, the mood of the Eisenhower Administration and Congress was to cut spending to the bone.

But when Congress opened last month, it was in a mood to spend and the President was there to tell it how the spending would be done.

Of the $73.9 billion budgeted for fiscal 1959, President Eisenhower forecast construction expenditures of $7.2 billion during the fiscal year starting July 1. The figure tops the current year's by $1 billion and is the highest since 1942.

• Fast money—Congress hastened to back up the Administration and already the House has approved a $550 million emergency authorization bill for the construction of missile bases in the U.S. and the dispersal of Strategic Air Command bomber bases. Money to back up the authorization bill is contained in a $1.3 billion supplemental appropriation bill given to Congress by the President. The money will be available for contract awards this year as fast as the military can commit the funds.

There is another side to the coin, however, that point to changing Administration philosophies. Prominent among these is the President's suggestion that more of the cost of urban redevelopment be shifted to the communities.

This will not hit at urban redevelopment this year, because the President did ask for additional grant funds of $200 million for the upcoming fiscal year. This amount would be added to

$50 million held over from the $350 million Congress approved for this year.

But after 1959 the Administration would like to see less than the two-thirds to three-fourths participation by the federal government in urban renewal. This move would eventually provide some economies, but whether the lawmakers will buy the idea is another question. The nation's municipal heads have been asking for more funds and more federal participation—not less—and it is to the people back home that Congressmen listen.

• **Public housing trends**—The President told Congress that no additional authorization for public housing is required in 1959 and that there is a carryover of 33,000 units that could be contracted for this year from the 1956 authorization of 70,000 units.

In other ways too, the public housing authorities are seeking economies. U.S. Public Housing Administrator Charles E. Slusser smiled favorably upon a request from Philadelphia that it be allowed to work on plans that would see the city buy, renovate and then lease as public housing units, older private dwellings. There may be as many as 200 structures included in this plan which represents a complete departure from the present practice of constructing new apartment buildings for public housing use.

• **Renovate, not raze**—Despite the huge sums that have been obligated and spent for urban redevelopment, there is tacit admission by federal and municipal officials that the program is not moving as fast as slums are growing.

Although the program was originally planned as a combination of razing-rebuilding and renovation, it is the former upon which emphasis has been placed by the communities. The idea of new cities from the ground up gripped the imagination of local officials and civic leaders.

Now federal officials would like to see greater emphasis placed on renewal of blighted sections, with razing confined to the scattered structures within the slum area that cannot be economically salvaged through renovation.

To this end, a new office complete with a staff has been established in the urban renewal division of the Housing and Home Finance Agency. The staff, with missionary offices in half a dozen cities where pilot renovation projects have been started, is stepping up its campaign to encourage remodeling to its fullest extent.

• **New markets**—Should this program gather momentum, the building materials manufacturers and small local contractors could find a large new field of business opened to them. Another experiment in public housing is under way and is one that dovetails with the urban renewal program. It could bring the smaller individual homebuilders and the prefabricated home industry into public housing.

At Cedartown, Ga., the local housing authority has been empowered by the Public Housing Administration to build single- to four-family low rent houses on individual lots. Completed are 20 dwellings of single and duplex types on seven sites. Five slum houses were razed in order to make way for the new houses.

• **Tax conscious voters**—That the public in general is becoming more conscious of taxes and costs in relation to bond issues was readily apparent last November at bond referendums across the country.

This voter resistance may become even more noticeable at referendums this year, because with state and municipal outlays continuing to mount in the face of declining revenues, tax boosts were noted in some states even before the current year was one month old.

John Q. Public could very well decide to turn his back on a rash of proposals for new libraries, new city auditoriums, new city halls, new jails, and even new schools, because affirmative action at the polls also could result in new taxes or an increase in the rates of existing taxes.

This trend, however, will have little effect in 1958 on public works construction as the issues already approved will move into the market and be used to finance the projects for which they were intended. In fact, public works generally will be a top performer this year as it was last year.

• **Competition and "hard sell"**—Along with the decline in construction during 1957, a downturn that will continue by a small amount in this year, contractors will again be faced with sharp competition.

This became apparent during the latter part of 1957 with respect to federal-aid highway bidding. Out of nine states reporting bid prices and number of bidders in the third quarter, seven showed a decline in bid prices and an increase in the number of bidders per job, in comparison to the same period of 1956.

And according to the Bureau of Public Roads, bids per job in the federal-aid program rose to an average of 7.2 in the first quarter but dropped in the second quarter to 6.0. The latter figure, however, was up from the 5.0 average that was recorded for the second quarter of 1956.

The picture is not likely to change quickly and will be approximated in many other types of construction.

For example, when the Bureau of Highways in Maryland last month put out a small job for bid in the Baltimore area, 19 bidders scrambled for the contract. It went for $17,800. And in the same state a drains, sewers and water system project drew 23 bidders with the cost for nine items coming in at $111,000.

• **It hurts**—Any continuation of this type of keen competition must, of course, take its toll. It did last year. (See table below.)

Construction contractors folding in 1957 reached another high point according to Dun & Bradstreet, with 2,105 going down for the count. This was a 15% increase over 1956. And current liabilities involved in the demises topped $110 million, up 9% over 1956.

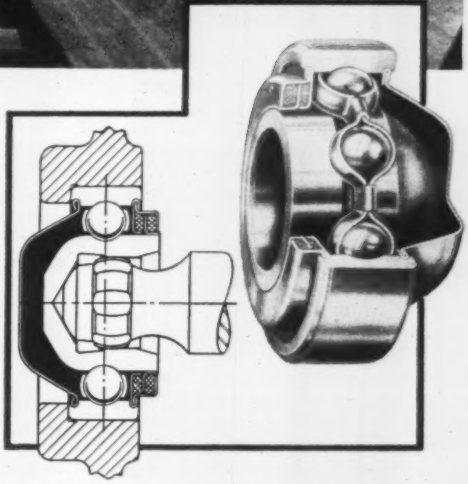
Contractor Failures—1956 and 1957

Reported by Dun & Bradstreet

	Number		%	Liabilities in thousands		%
	1957	1956	Chg.	1957	1956	Chg.
U. S. Total	2,105	1,834	+15	$110,312	$100,803	+ 9
By Type of Contractor						
General Building contractors	805	708	+14	64,425	54,115	+19
Building sub-contractors	1,175	1,030	+14	36,466	41,400	−12
Other contractors	125	96	+30	9,421	5,286	+78
By Size of Liability						
Under $25,000	1,132	959	+18	12,791	10,962	+17
$25,000–99,999	739	644	+15	34,700	31,597	+10
$100,000 & over	234	231	+ 1	62,821	58,244	+ 8
By Region*						
New England	119	96	+24	3,615	5,884	−39
Middle Atlantic	445	387	+15	33,781	25,776	+31
South	314	275	+14	13,861	14,358	− 3
Middle West	419	339	+24	20,900	16,830	+24
West of Mississippi	285	207	+38	14,528	13,334	+ 9
Far West	523	530	− 1	23,628	24,621	− 4

* ENR regions approximated by combining Federal Reserve Districts of original data

ND FACTS



Unique shape of the inner ring of Type CB-504, together with hexagonal curved surfaces on end of stub shaft, provides positive, self-aligning union between roll and supporting bracket.

NEW DEPARTURE BALL BEARINGS CUT COSTS IN CONVEYOR SYSTEMS

New Departure sealed and lubricated-for-life conveyor bearings have demonstrated their economy and dependability for many years in installations varying from sand and gravel plants to huge dam-construction projects.

These bearings do away with lubricating fittings, with grease piping, springs or adjusting devices and other miscellaneous items. Also, periodical greasing is eliminated with consequent important savings in both labor and lubricant costs.

New Departure Type CB-504 bearings are unique in that they utilize short, easily removable stub shafts allowing a self-aligning motion in the bearing bore, yet at the same time preventing the inner ring from turning.

Carriers developed around these few parts are simple in design and remarkably easy to erect in the field.

For complete information on New Departure bearings, call or write New Departure, Division of General Motors, Bristol, Conn.

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What's happening to wages?

Last year's pattern—average increases of 16 cents, improved fringe benefits and long-term deferred pay boosts—sets a brisk pace for 1958 demands.

Wages Are Moving to Higher Levels

Construction labor costs are increasing at a steady pace and there's no significant indication that the upward trend will lose its momentum in the months immediately ahead.

Despite growing concern over a soft economy, new labor contracts are incorporating hourly wage increases ranging from 10 to 30 cents. Reported settlements are hitting an average of 17 cents an hour for 1958 increases, of 15 cents for deferred pay boosts.

Long-term contracts—mostly for two and three years—are holding their own. Fringe benefits are being improved.

Outlook is for another year of last year's collective bargaining pattern that gave construction workers an average hourly wage increase of 16 cents and increased the number of long-term contracts, with future wage boosts predominantly fixed rather than tied to reopening or escalation clauses.

Within this general framework, local adjustments to local situations are expected to continue. But, in general, labor has already shown signs of being more concerned over future increases in the cost of living than over the effect of wages on construction employment.

• **The past**—Automatic pay increases due this year under existing long-term contracts are probably the most influential single factor in the current picture. Not only do they afford an inducement to pattern bargaining—to get what others have gotten—but they've also been a strong deterrent to any voluntary wage freeze among construction workers.

At least 19% of the construction labor force will this year receive deferred hourly wage increases ranging from 5 to more than 25 cents. Increases of 15 to 17 cents will go to more than 7% of the force.

According to the U. S. Labor Department, 4 million workers in American industry are slated to receive deferred wage increases in 1958 under 530 existing major contracts (each involving 1,000 or more workers). Of these, 584,000 workers are in construction, where most of the automatic increases are payable in January, May or July.

Unlike workers in other industries—such as steel and aluminum—most of this group will not receive additional cost-of-living increases, which are still uncommon in the construction industry.

Incidence of long-term contracts in small collective bargaining situations is unknown. But the Bureau of National Affairs has analyzed 896 construction labor contracts reported in its "Construction Labor Report" last year and says that 51% were for a longer term than one year, with two and three year durations the most popular. Deferred increases in 1958 under these contracts will average 14.9 cents an hour.

Added to the momentum thus achieved are the building trades' impressive results for 1957 still fresh in the minds of all.

Average 1957 hourly wage increase for all crafts in the BNA analysis was 16.1 cents, with 15 cents the most popular boost; 30 cent increases were won in 11 contracts.

Of the 896 contracts covered by the BNA analysis, 53% called for health and welfare benefits, which were new in 24 instances; apprentice training contributions were established or carried over in 55 contracts; new pension plans were set up in 41; paid vacations were newly established in 11, paid holidays in 4.

• **New forces**—Upcoming collective bargaining sessions will be conducted against this general background but in the presence of other strong forces that will tend both to bolster and depress the demands of labor. Among them are these:

• Organized labor is stepping up its drives for new members, and this implies, in the words of a teamster leader, "a never ending fight for the economic betterment of union members."

• The AFL-CIO is more stoutly committed than ever before to the proposition that higher wages are necessary to provide the purchasing power essential to a healthy economy.

• The Consumer Price Index has climbed from 118.2 to 121.6 in the last year and employment has fallen off—down 2.8% in construction in the year ending last October. Nation's unemployed is nearly 4 million; almost a third of the major industrial areas have substantial unemployment; reduced workweeks are not uncommon; personal income is down.

• **Current negotiations**—How have these affected 1958 bargaining? Results to date indicate that the depressing factors have had little effect on the buoyant ones. Neither seems to have had any effect on the frequency or success of strikes or on use of long-term contracts.

In 8 out of 12 areas that have completed their negotiations, long-term contracts already have been signed, providing for present, and deferred increases of 10 to 30 cents an hour. In two cases, deferred increases may be supplemented by cost-of-living increases under escalation clauses. In most instances, existing fringe benefits have been carried over or improved.

Biggest increase has been obtained by plumbing trades in Oakland, Calif., where a three year contract boosted existing wages 28½ cents and added 2½ cents to health and welfare; second and third year increases of 25 cents each may be taken either in basic rates or fringe benefits.

In 13 central and western Arkansas counties, a three-week strike has ended in unprecedented three-year contracts between the AGC and iron workers, carpenters, cement finishers and laborers, providing for package increases of 35 to 40 cents.

Only a few instances have been reported where local conditions have apparently required unusual adjustments.

One of these occurred in St. Louis, where an estimated 10 to 15% of the building tradesmen are unemployed. Three trades have deferred until March 1 the pay increases they had hoped to get on January 1 and have spread these over two years instead of one.

And in Detroit, the Painters District Council asked for a four-day week for January and February, as permitted by contract, to prevent widespread layoffs.

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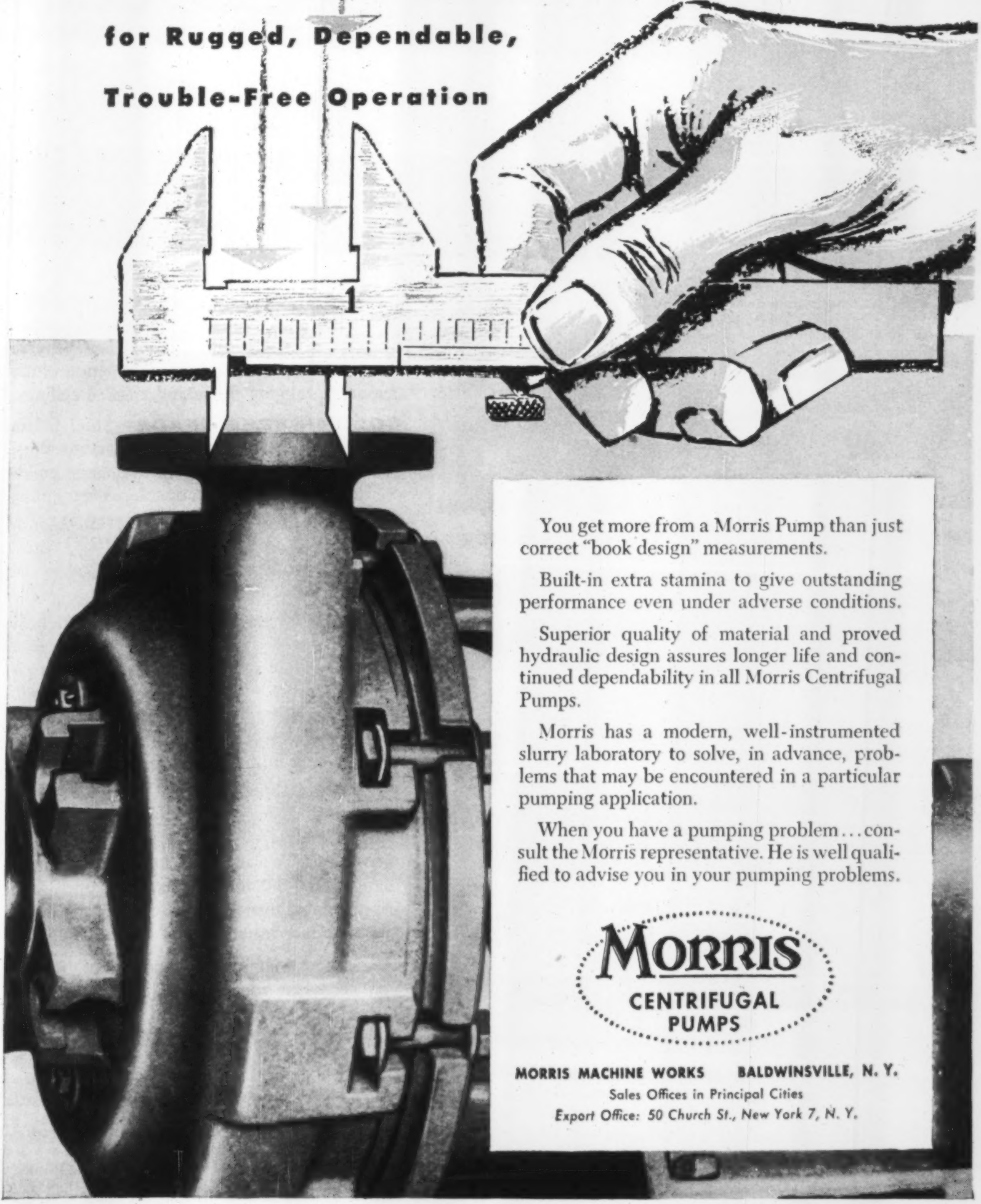

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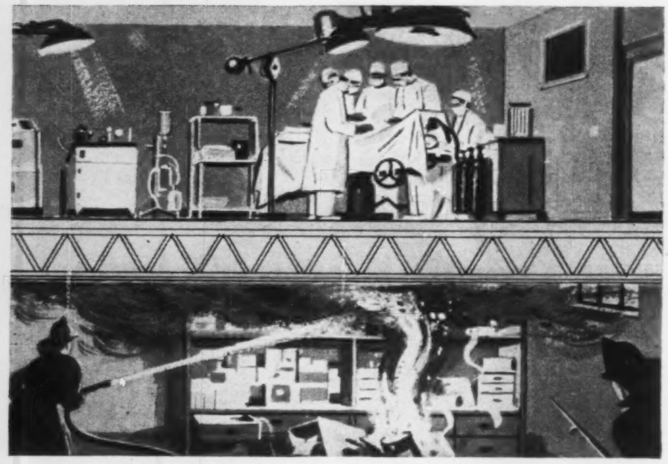
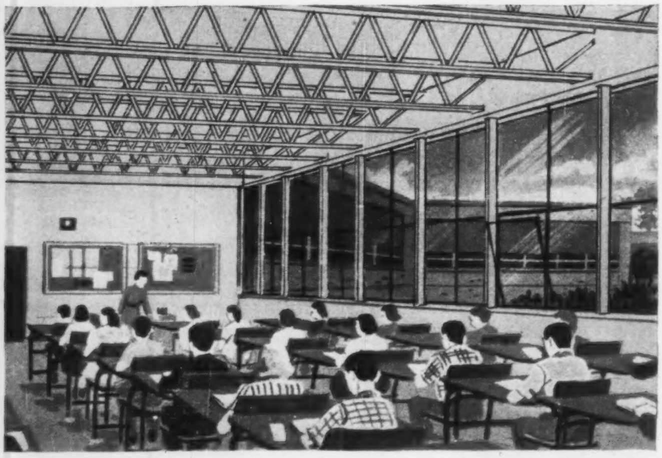
SIX GOOD REASONS FOR DESIGNING WITH STEEL JOISTS



FIRE-RESISTANCE



NON-SHRINKING, NON-WARPING

FIRE-RESISTANCE—Steel joists in combination with floor slab and plaster ceiling form a barrier with up to four hours' fire-resistance, depending on slab thickness and the type of plaster. And greater fire-safety is of particular importance in multi-story buildings such as hospitals, apartments and schools.

NON-SHRINKING, NON-WARPING—Building maintenance is greatly simplified when you design with joists. They provide non-shrinking, non-warping construction which eliminates sagging floors and cracked ceilings.

COLUMN-FREE SPACE—Steel joists are ideal for long spans such as auditoriums, gymnasiums, garages, stores. And in any building they give a maximum of column-free space.

VIBRATION-RESISTANCE—Good, firm floor construction is assured with steel joists. Adequate stiffness in floors is of special importance in multi-story buildings.

SOUND-RESISTANCE—Bethlehem Joists used with concrete floor slabs and plaster ceilings provide a dead air space. Also there is minimum contact between floor above and ceiling below, effectively dampening the transmission of sound in both directions. Here's a real advantage for hospitals, offices, and apartments.

FAST, ECONOMICAL CONSTRUCTION—Joists arrive at the job fully fabricated and tagged, ready for immediate placing. Two men can easily place small joists, and a simple derrick lifts the larger sizes. The open-webs permit concealment of pipes, conduit and ducts, and simplifies installation of recessed lighting.

These are some of the important advantages you get when you use Bethlehem Open-Web Steel Joists. And Bethlehem Joists are fully approved by the Steel Joist Institute.

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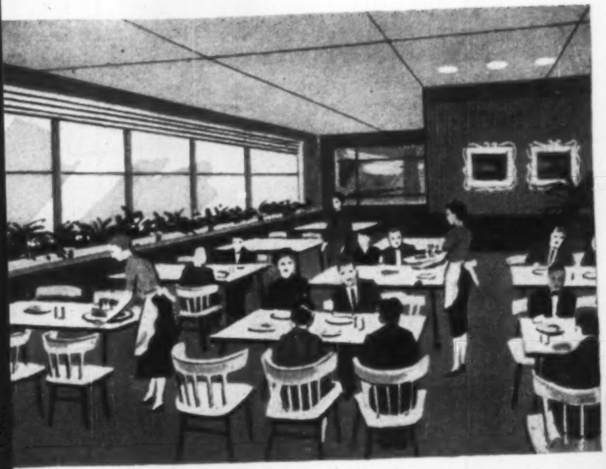
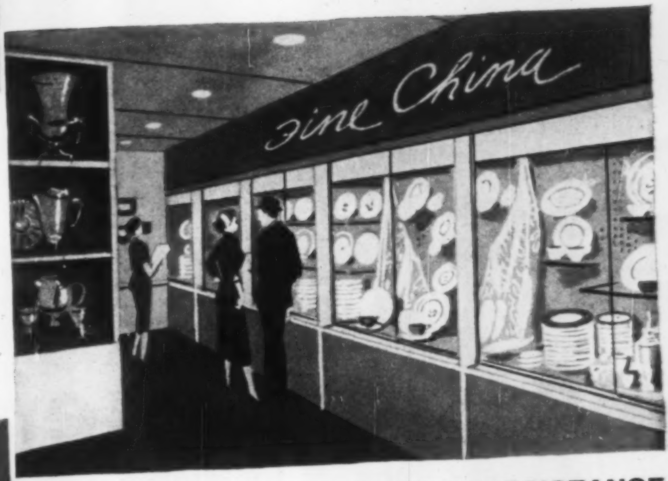
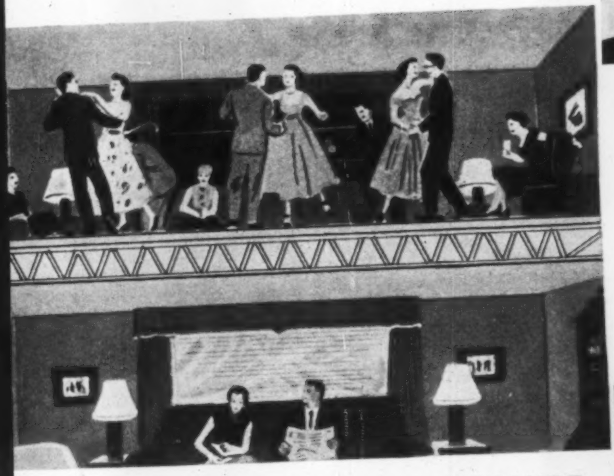
BETHLEHEM STEEL



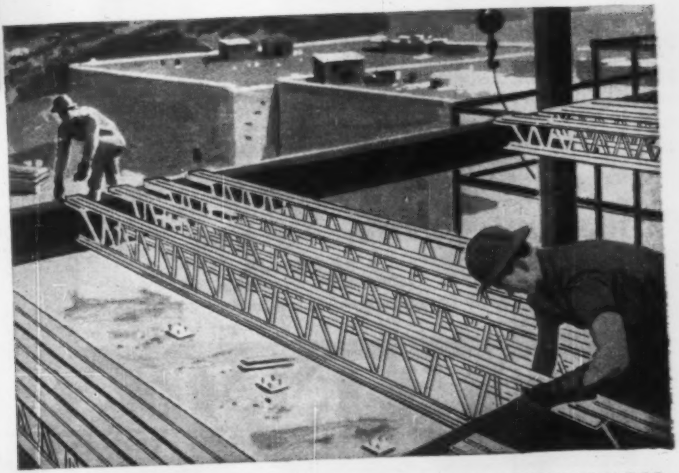
COLUMN-FREE SPACE



VIBRATION-RESISTANCE

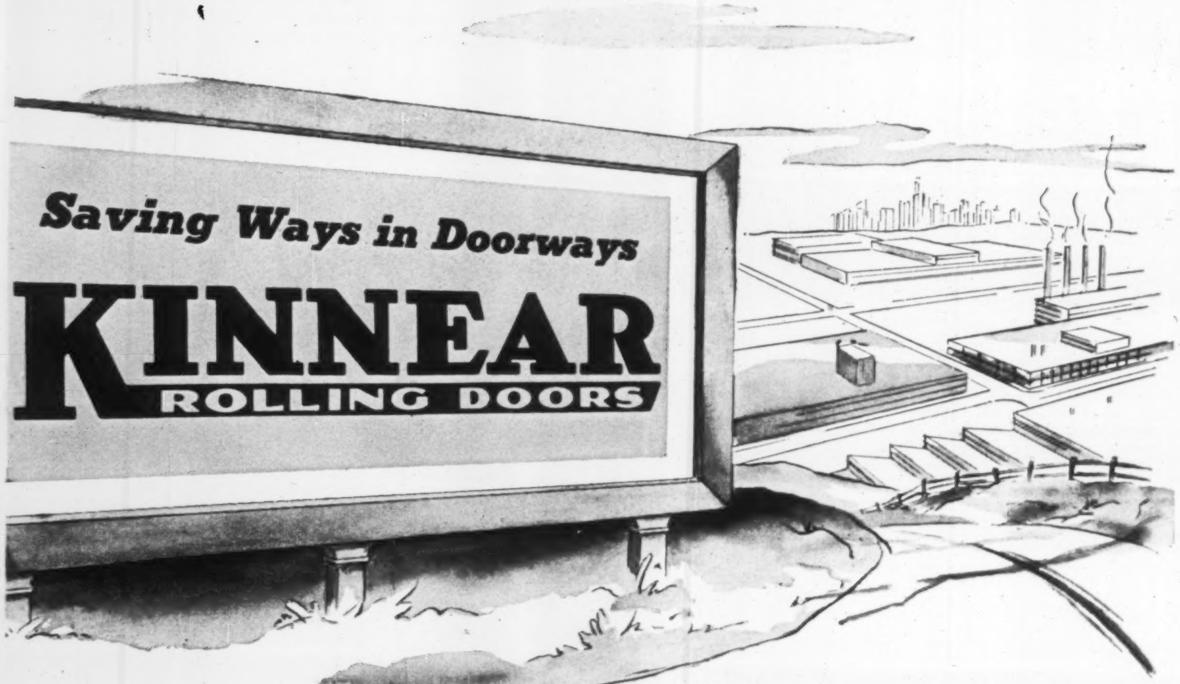


SOUND-RESISTANCE



FAST, ECONOMICAL CONSTRUCTION

BETHLEHEM STEEL



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for every type of building

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This cuts traffic delays and bottlenecks and promotes *prompt* door closure, reducing loss of heated air in winter, cooled air in summer.

In addition, Kinnear Rolling Doors assure extra all-steel protection against wind, weather, fire, intrusion and vandalism.

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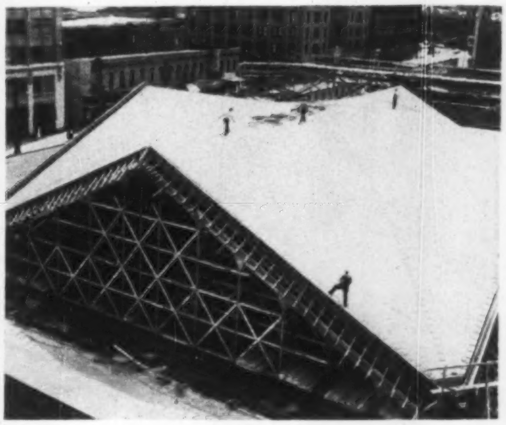
ROLLING DOORS



Hyperbolic-paraboloid roof of a Denver store with a 112x132 ft column-free area is one of many unconventional designs constructed last year.

In 1957—New Shapes Get a Tryout

For building construction, 1957 was a year that appears at short range to be undistinguished by spectacular, record-breaking achievements; yet there were course-changing events. Most prominent was the adoption by architects and engineers of unusual shapes for buildings and the ingenuity of contractors in developing means of constructing them economically.

Looking back, we can now see that the building boom reached its peak in the first half of 1956. Throughout the last half of that year and throughout 1957 the dollar value of contracts awarded for building construction declined, the total for 1957 being nearly 30% less than for 1956. Nevertheless, in view of the abnormally high activity during the previous, record-breaking year, the building business still did well in 1957.

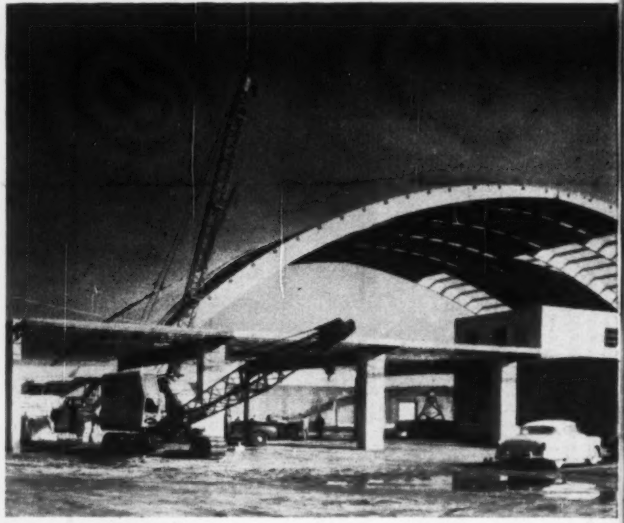
• **A century of progress**—Despite the high level of activity, the building industry found time last year to take inventory of its achievements. It looked backward a century to see what progress it had made and then criticized the present. The occasion was the centenary celebration of the American Institute of Architects in May (ENR May 23, 1957, p. 24). Later, it tried to foresee the future by extrapolating contemporary design at the Third National Construction Industry Conference in December (ENR Dec. 19, 1957, p. 23).

The backward look disclosed big changes in building design and construction in the past 100 years. The skyscraper evolved; industrial buildings were developed into efficient shelters for mass production, ready for automation; house construction was speeded by adaptation of industrial assembly-line techniques; varieties of construction materials increased from a comparative few to thousands; and mechanical and electrical advances made possible close control of interior conditions (ENR May 23, 1957, p. 33).

However, little time was wasted at the AIA centennial lauding past achievements. Seeking a better world for the future, speakers criticized contemporary conditions. They complained about housing, bemoaned lack of privacy, griped about traffic congestion and unplanned cities and outdid Malthus with dire predictions of vanishing resources in the face of rapidly increasing population. They called for change.

(Continues on page 104) →

GOLD-COLORED skyscraper rises in New York City.



RECORD SPAN for timber was set in 1957 by three-hinged glued-laminated arches for a 250 ft wide arena that was erected in West Hempstead, N. Y.

. . . Many unusual designs built in 1957

In contrast, the construction industry conference, sponsored by Armour Research Foundation of Illinois Institute of Technology, looked at today's achievements as presaging the better world of tomorrow. In line with the theme, "Creative Trends in Structural Design," speakers turned the spotlight on thin shells of various types, cable-suspended and air-supported roofs and huge sheet aluminum domes. They analyzed newest types of materials, discussed new developments in design methods and explored the potential of high-speed electronic computers in structural design. They showed that changes already were taking place.

• **Buildings without corners**—While these trends had not originated in 1957, they definitely were strengthened last year. Perhaps, in the long run, 1957 may be remembered as the year in which building designers loosened the shackles that bound them to traditional shapes, in particular, freed themselves from the confines of the right angle. For plans were announced and construction started on a great many odd-shaped structures last year.

Some were simple—like the grain storage bins developed by Cargill, Inc., a midwestern grain handler. Sloped to parallel the angle of repose of the grain, one built at Crookston, N. D., resembles a circular tent. It was made of light-gage steel, hung from an 86 ft high mast at the center of the 169 ft dia bin. Another, built in Maumee, Ohio, is a circular cone 200 ft in diameter and 100 ft high. Plans called for steel sides with an air-supported roof of glass-fiber reinforced plastic (ENR Aug. 1, 1957, p. 33).

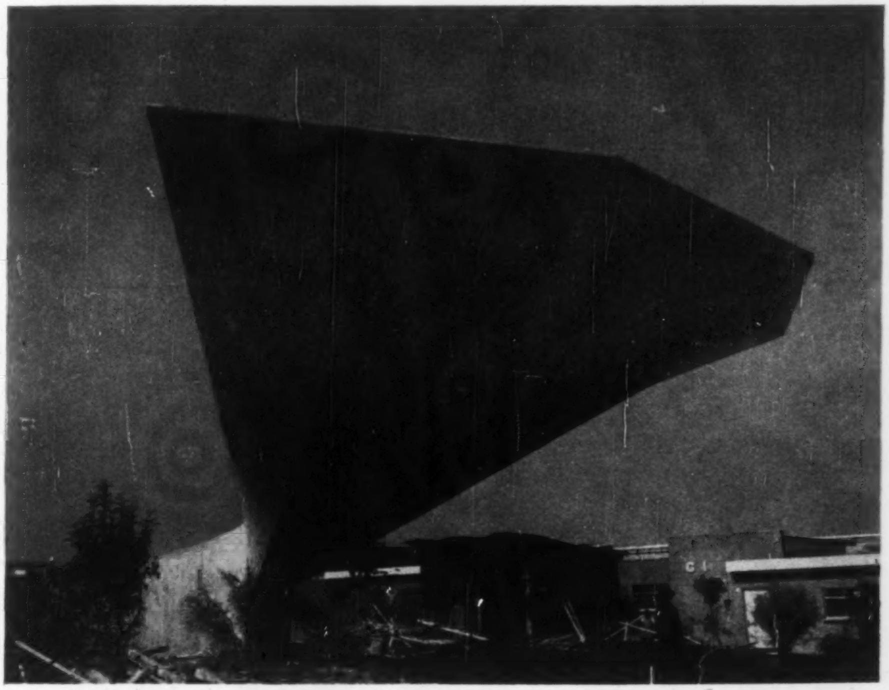
Others were complex—like the Guggenheim Museum in New York City, on which construction finally was started after Frank Lloyd Wright's design was modified to satisfy the city building code. Following the shape of its exhibition space, the concrete building resembles a compressed spring. Its outer wall circles around and up from the ground with gradually increasing radius. Pictures on display will be hung on the sloped inner face of this wall and will be observed from a spiral concrete ramp. On top of the building is a glass dome (ENR Dec. 5, 1957, p. 42).

• **Hung roofs**—In many cases, roof design was the unconventional feature. For one thing, the trend to cable-supported roofs continued in 1957. Typical examples are the Trans World Airlines hangar at Kansas City, completed in midyear, and the hangars under construction at New York City. These have folded-plate concrete roofs that project out about 150 ft from a central section and are supported near the outer ends by steel cables. The cables are attached to anchor walls atop the center section (ENR Jan. 26, 1956, p. 44).

Another example is the curved terminal building planned for Pan American World Airways at New York International Airport. It will have an elliptical core surmounted by a cable-suspended, elliptical concrete-slab roof. Framing for the roof consists of radial steel girders. These are supported at one end on columns around the perimeter of the core and projected out 110 ft, where they are attached to cables tied back to a central ring (ENR April 11, 1957, p. 25).

A novel type of hung roof is the Yale hockey rink under construction in New Haven. There a wood roof rests on cables strung between the curved outer walls of the building and a central arch, resembling the spine of a dinosaur.

And even more unusual is the U. S. pavilion being constructed in Brussels for the 1958 World's Fair. One of many unconventional structures that will vie for the attention of fairgoers (ENR Sept. 26, 1957, p. 36), this one has a roof that resembles a spoked bicycle wheel lying horizontally. The hub is a circular truss 66 ft in diameter.



CANTILEVER 40 ft long composed of six hyperbolic-paraboloids springing from a single support forms a bandstand roof in Mexico City.

It is supported by cables attached to its top and bottom chords and anchored to the rim—a horizontal, circular ring truss with an inside diameter of about 300 ft. This truss, in turn, is supported on two rings of columns.

• **Double-curved roofs**—The trend to thin, hyperbolic-paraboloid roofs also continued in 1957. Probably the most outstanding examples can be found in Mexico City, the work of Felix Candela, architect-engineer-builder. There, these warped surfaces in thin-shell concrete can be seen on factories, warehouses, churches and bandstands (ENR May 16, 1957, p. 36). In the U. S., too, they began last year to appear on a wide variety of structures—factories, stores, reservoirs.

The shape is not restricted to concrete, however. Hyperbolic-paraboloids were also built of plywood. And in Fort Worth, Tex., several structures were roofed with warped surfaces of glass-fiber reinforced plastic (ENR July 11, 1957, p. 63).

Another unconventional double-curved surface made its debut in 1957. Used to roof a supermarket in New Canaan, Conn., it is generated by a curve moving through space with translational motion. The thin concrete shells forming this roof were precast on the ground and erected with a crane (ENR Aug. 8, 1957, p. 33).

Still another unusual roof is the conoidal one used for a workshop and showroom in New Hope, Pa. (ENR Dec. 5, 1957, p. 46). The conoid is a surface described by a series of straight lines, parallel in plan, connecting a horizontal straight line and a vertical arc. The horizontal line in this 40x40 ft building is a concrete lintel atop the rear wall. The arc is a reinforced concrete circular arch across the front of the building. The thin concrete shell, deeply corrugated from front to rear, is supported on the lintel and the arch. It also overhangs them to form a canopy at front and rear.

• **Vaulted roofs**—In November, plans were announced for a Trans World Airlines terminal building at New York International Airport that looks much like a bird in flight. Thin-shell concrete vaults supported on concrete frames project up and out on two sides of a vaulted center section.

Thin-shell vaults will also roof a church in Houston, Texas. But these shells will be of sandwich construction—a layer of foamed polystyrene insulation and 1½ in. of sprayed-on concrete reinforced with welded-wire fabric (ENR Sept. 5, 1957, p. 33).

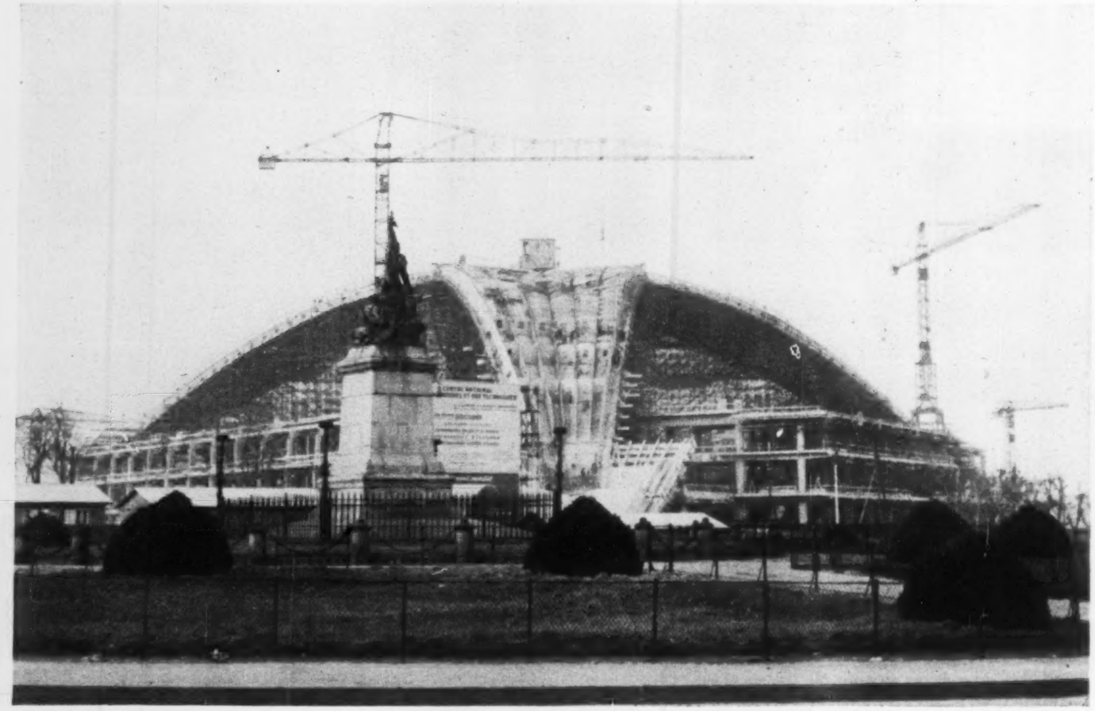
• **Record roofs**—Most spectacular of all from the viewpoint of size is the concrete roof now being constructed for a new exhibition hall a few miles outside Paris. Consisting of three intersecting cylinders, the roof of the Centre National des Industries et des Techniques will be an equilateral triangle in plan. And the supports, at the apexes, will be 721 ft apart (ENR Aug. 22, 1957, p. 56).

Each of the cylinders consists of a pair of 3 in. thick shells, with the space between ranging up to 6½ ft. deep. The cylindrical surfaces also will be corrugated.

The roof will have the longest concrete span ever constructed in a building, and the exhibition hall, with more than 1 million sq ft of floor area, will be the world's biggest. The facades of the structure will be glass on light steel framework.

However, the record may be surpassed if plans for a sports arena announced last year for the New York area are executed. Spacious enough to enclose a half-mile race track, the roof will consist of a series of hyperbolic-paraboloids with a clear span across the building of 1,080 ft (ENR Feb. 21, 1957, p. 47). The curved units probably would be made of sheet aluminum.

• **Folded-plate roofs**—Despite the trend to curved roofs, flat surfaces were not completely neglected for the unconventional designs of 1957. For example,



DOUBLE-CURVED ROOF consisting of two thin concrete shells being constructed near Paris for an exhibition hall will set a record for concrete spans. It will be supported at three points 721 ft apart.

. . . Ingenious erection of novel designs

the trend to folded-plate roofs also continued.

This type of construction was selected for the American Concrete Institute's headquarters building being erected in Detroit. Cantilevered on both sides of a central corridor, the folded concrete slabs are supported only on the corridor walls and project out 19 ft (ENR Oct. 24, 1957, p. 44). The folds are such that the peaks at the outer edges line up with valleys at the supporting walls. The slabs were precast.

Precast folded-plate construction also was used for an unusual school building in Daly City, Calif. The structure is circular and surrounds a central garden (ENR Nov. 7, 1957, p. 63).

Flat surfaces were adopted for the chapel design approved last August by the House of Representatives for the U.S. Air Force Academy, under construction at Colorado Springs, Colo. The arched exterior consists of tetrahedrons made of aluminum panels supported on pipe sections (ENR Aug. 22, 1957, p. 25).

• **Ingenious erection**—Methods used by contractors for constructing the curved roofs were almost as varied as the designs. For concrete roofs, the builders showed great ingenuity in devising ways to reduce falsework costs to a minimum. Here are a few examples to illustrate the variety in techniques:

▶ **Form reuse**—Howard S. Wright & Co., Seattle contractor, designed and built a jumbo for moving formwork for barrel arches speedily from one barrel to another. A lifting frame on the wheeled jumbo raises and lowers the forms when activated by a 5 ton hoist. The lift was powered by a 3 hp motor with 18 to 1 geared reduction (ENR May 9, 1957, p. 45).

▶ **Forms but no shores**—For hexagonal buildings with roof framed with six radial and six perimeter precast concrete beams, Graham & Jensen, Merced, Calif., contractor, utilized the deck reinforcing steel to support the forms. The steel bars were draped in flat catenaries between beams and welded to steel inserts in the beams. Paper-backed wire mesh served as forms for the 2½ in. thick vermiculite-concrete slab (ENR March 14, 1957, p. 47).

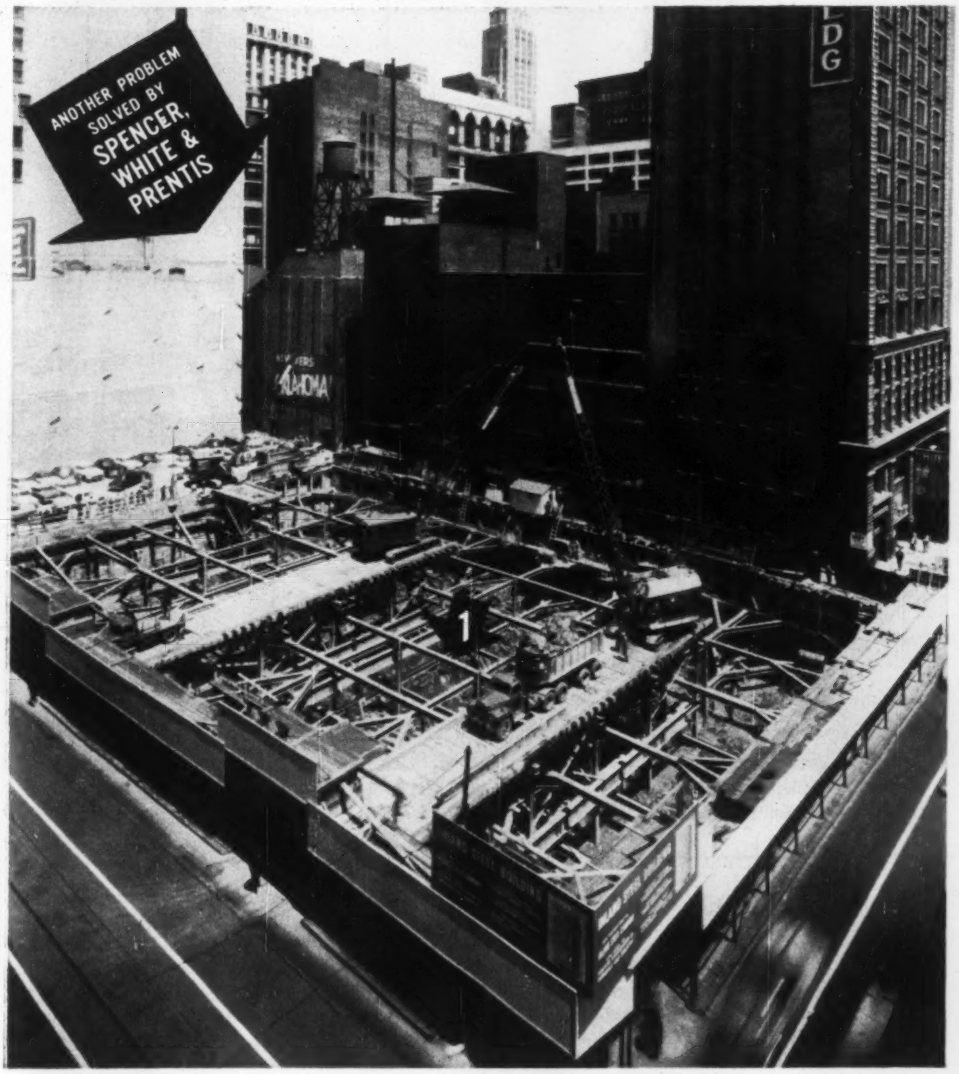
▶ **Precast**—This technique was adopted by a great many contractors. One of the most outstanding applications was for the barrel arches for a high school gymnasium in Daly City, Calif., that probably were the biggest of the type ever to be precast. Weighing 20 tons apiece the units were 3½ in. thick, 61 ft long and 15 ft wide (ENR Jan. 31, 1957, p. 45).

▶ **Prefabricated**—Concrete arches and their ties for a 100 ft wide supermarket in Alpena, Mich., were made of concrete block held together by tensioned wires (ENR Dec. 5, 1957, p. 26). The roof deck, spanning 18 ft between arches, was similarly fabricated with prestressed concrete block. Elasticrete Construction Corp., Alpena, was the contractor.

• **Air-supported structures**—In a year in which helicopters were used on several occasions to raise a component for installation atop a tall structure, probably one of the most spectacular techniques was the assembly of a 145 ft aluminum dome with the aid of balloons. As the metal panels were connected together from the crown outward, the balloons were inflated with air, raising the portion assembled to permit addition of panels around the exterior (ENR Nov. 28, 1957, p. 24). The structure is to be used as a factory in Abilene, Kan.

It is interesting to note also that increasing use was made in 1957 of similar air-supported structures for a variety of enclosure purposes—radomes, pool enclosures, storage buildings, etc.

(Continued on p. 108)



Project: New Inland Steel Building, Chicago, Ill.

Architects: Skidmore, Owings & Merrill, Chicago, Ill.

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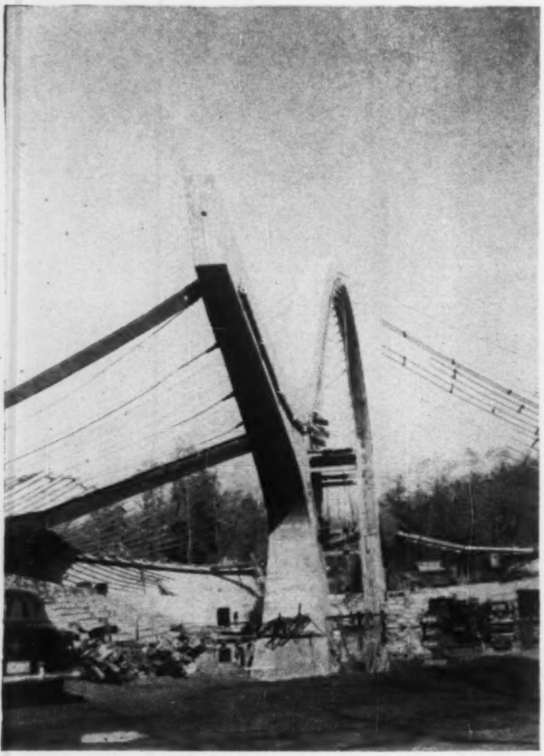
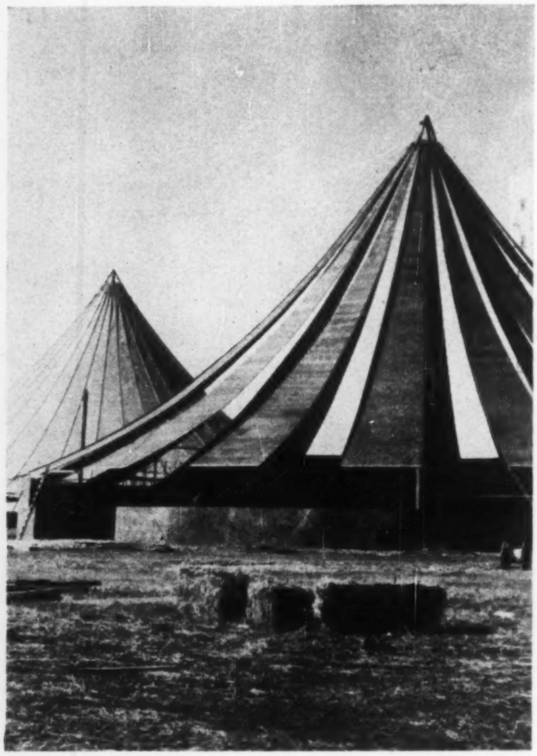


SPINELIKE concrete arch is anchor for cables supporting the roof of Yale hockey rink. Other ends are tied to side walls.



STORAGE BINS in Crookston, N. D., are made of sheet steel hung from a central mast.

. . . Progress in design and drafting

• **Record spans**—The trend to longer and longer spans continued last year, too, and 1957 was not completely devoid of records:

▶ Three-hinged, glued-laminated wood arches span 250 ft over an arena at West Hempstead, N. Y., about 8 ft longer than the previous record.

▶ Glued-laminated wood beams erected in Ashland, Ore., span 130 ft (ENR Nov. 7, 1957, p. 63).

▶ Light-gage steel roof assembled without a supporting frame spans 150 ft in Chicago. (ENR Sept. 5, 1957, p. 26).

▶ Steel girders erected at San Francisco International Airport cantilever 142 ft (ENR Feb. 21, 1957, p. 46).

• **High-speed computer**—Design of the unusual structural shapes now in use is complex. When analytical determination of stresses is practicable, it generally absorbs many, many man-hours of tedious computation. But last year there were signs that designers may soon be relieved of such labors.

During 1957, many structural engineering firms started to employ high-speed electronic computers both for stress analysis and designs. Computer programs were developed for a wide variety of structures—trusses, composite girders, continuous beams and frames. With further improvements in computers tending to lower costs, there should be a rapid acceleration in applications of the machines.

• **Speeding up drafting**—Efforts also were made in 1957 to step up design efficiency through improvements in drafting (ENR Sept. 12, 1957, p. 38). Recommendations included elimination of excess linework, unnecessary views and cross hatching; substitution of preprinted forms or typing for time-consuming lettering; use of templets and reproductions to save drafting time; and references to standards to eliminate repetition of drawings and notes.

Also, it was found that much design time could be saved by making model studies, combining photographs and drawings, and using rubber or plastic stamps, preprinted tracings and preprinted design forms.

• **Plastic design**—Other accomplishments of 1957 include steps taken to improve building materials or to use them to better advantage.

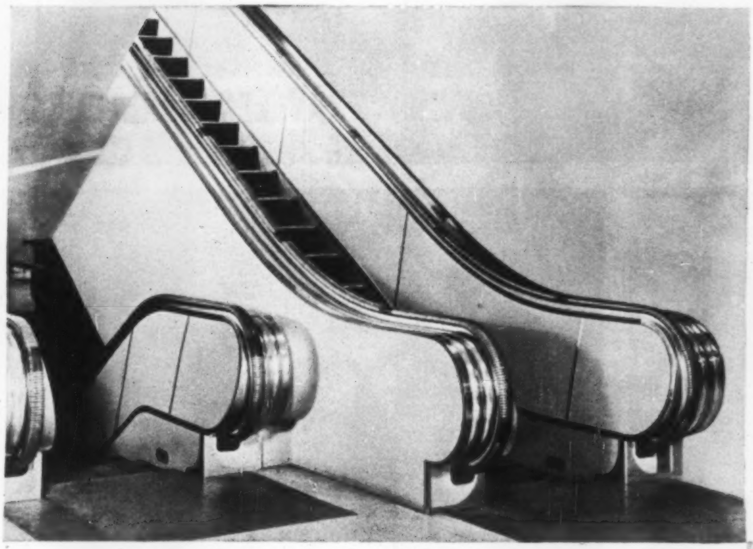
For one thing, headway was made with plastic design of steel (ENR April 4, 1957, p. 38 and 168). This method is not only simpler than design by elastic theory but also makes possible designs with consistent safety factors and presents an opportunity to cut steel costs.

The plastic theory assumes formation of "plastic" hinges at points of peak bending moment before failure occurs in continuous structures. These hinges convert continuous beams and frames into statically determinate structures, capable of carrying even more load after the hinges form. The design load is computed by applying a safety factor to the ultimate load computed on the basis of this assumption, which has been justified by tests.

At present the theory is limited in application to statically loaded, continuous, one-story steel frames. A design manual is being prepared by the American Institute of Steel Construction for publication this year. In the meantime, several small structures have been designed by plastic theory and were erected last year. (See, for example, ENR April 11, 1957, p. 59).

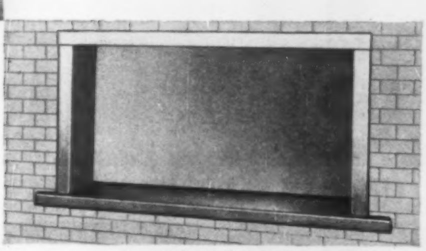
(Continued on page 112)

MANY FINE NEW SCHOOLS USE PEELLE-RICHMOND PRODUCTS



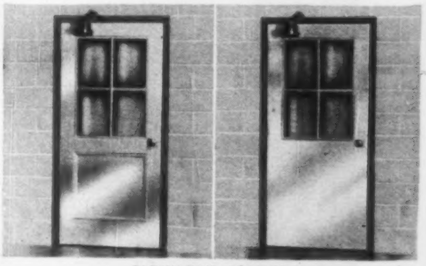
PEELLE MOTORSTAIRS

The New York City Board of Education has become the largest user of moving stairways in the school field. It has ordered 38 Peelle Motorstairs to be divided among the New York City schools as follows: Aviation Trades School, 12 Motorstairs; New York School of Printing, 12 Motorstairs; Fashion Institute of Technology, 14 Motorstairs.



DINING ROOM SIDE

PEELLE-RICHMOND PASS WINDOW — The Peelle-Richmond Pass Window is being used by many prominent schools. The pass window, consisting of an integral door and frame, requires only the installation of the frame, thereby reducing installation costs. The solid panel and integral rail and frame design eliminate dirt collecting crevices and maintenance. Pass window units can be provided in either stainless steel or plain steel construction. For low overhead conditions use the Peelle-Richmond "Telco" Pass Window.



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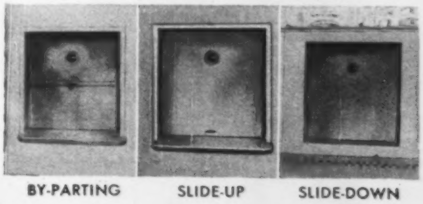
PEELLE DUMBWAITER DOORS — Peelle Dumbwaiter Doors should be specified in stainless steel construction or with stainless steel sills if plain steel units are desired.



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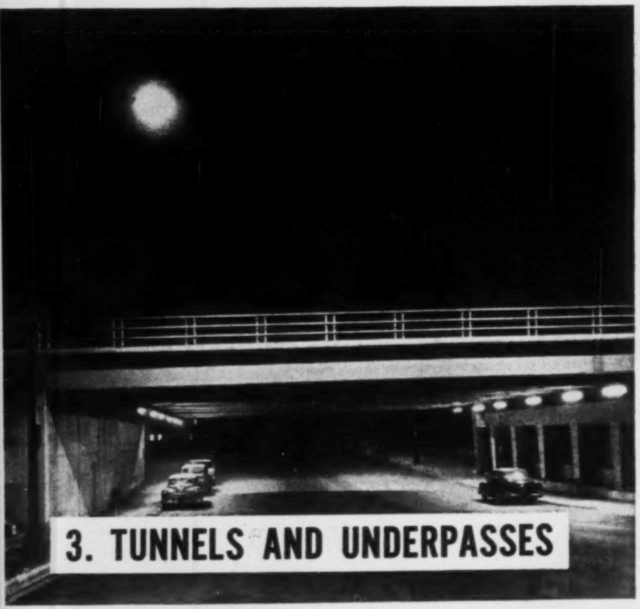
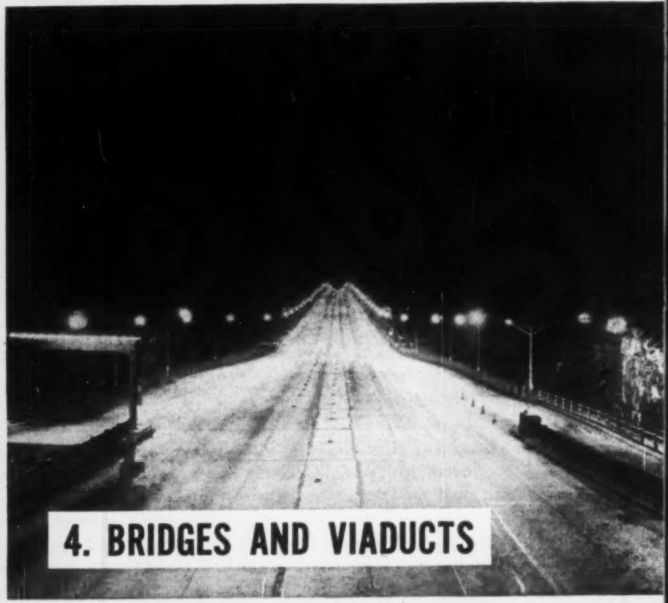
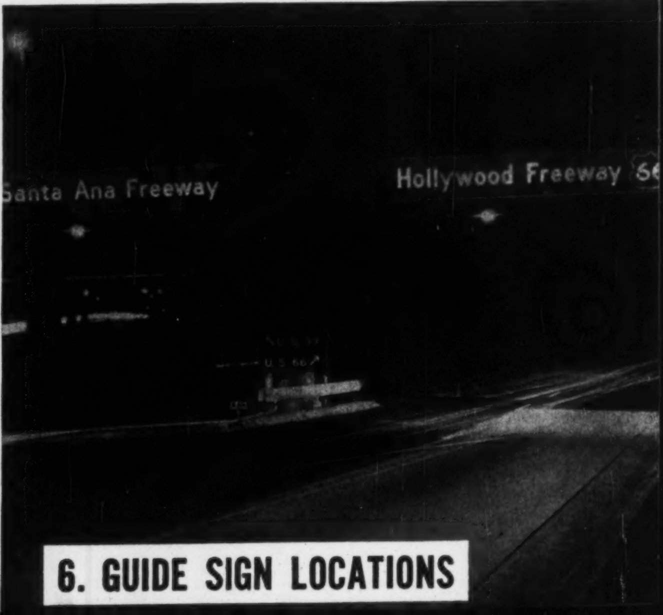

3. TUNNELS AND UNDERPASSES


4. BRIDGES AND VIADUCTS

5. INTERSECTIONS


Santa Ana Freeway
Hollywood Freeway 66
6. GUIDE SIGN LOCATIONS

7. INTERCHANGES

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Twenty-two thousand deaths . . . 750,000 injuries . . . $2½ billion economic loss! This was the toll of *night* traffic accidents on the nation's highways in 1956.

How can these staggering figures be reduced? Conservative estimates indicate that adequate lighting for highways would cut night accidents—and resultant loss of life and property—by at least one-half. More than 10,000 lives would be saved each year.

Accident studies reveal *seven deadly areas* on modern roadways. Wherever traffic converges, slows, or speeds, accidents most often occur. These areas, shown here, are the locations for which General Electric recommends modern highway lighting.

Present-day speeds of 50 to 60 mph demand that highways furnish every possible assistance to the vehicle operator, especially at areas of driver decision. The extra time afforded by better visibility aids the driver in making correct decisions. This is the primary role of roadway illumination.

Proper lighting after darkness improves the usefulness of the entire roadway. Increased, yet smoother-flowing, traffic results because (1) use of highway is encouraged on a 24-hour basis, (2) lane capacity is more fully utilized, and (3) higher speeds are permissible without loss of safety.

The beginning of the greatest building project in history was signaled by the passage of the Federal Aid Highway Act of 1956. Key areas along 41,000 miles of superhighways need the safety and traffic-expediting benefits which light brings.

Get full information today about General Electric's complete lines of highway lighting luminaires and control equipment by contacting your nearby Apparatus Sales Office. Or, write to Section 455-19, General Electric Company, Schenectady, New York.

Put General Electric's 30-plus years of highway lighting experience to work in helping make your roadways safer and more efficient!

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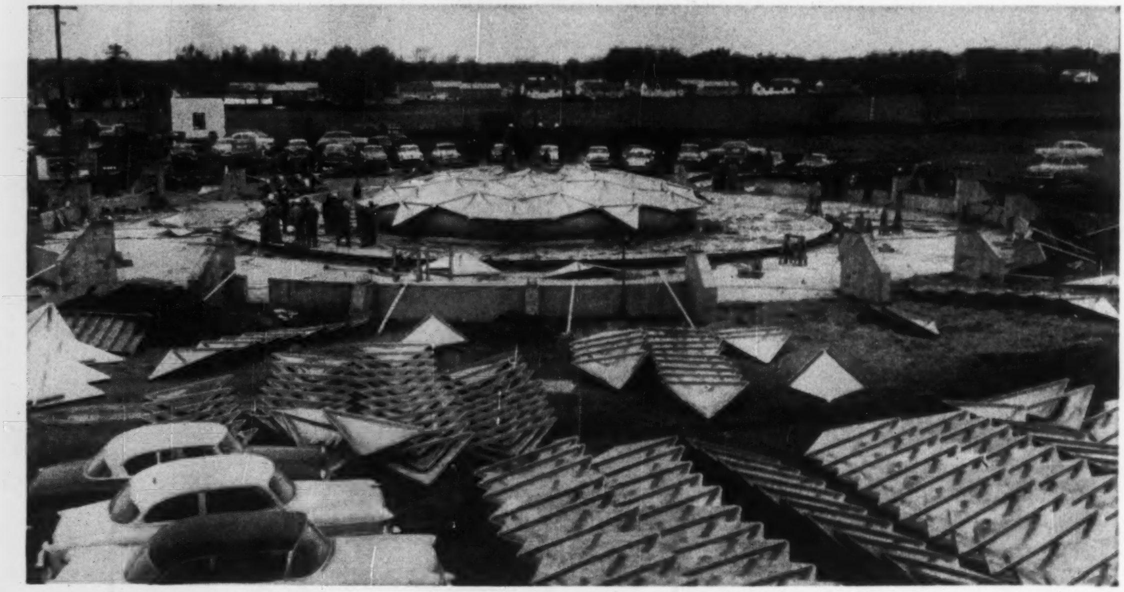


FAST ERECTION in Abilene, Kan., of a 145 ft dia aluminum dome was accomplished with the aid of balloons. Panels were assembled from the crown outward as the balloons—one atop the other—were inflated.

. . . Changes in walls as well as roofs

• Progress with concrete—Headway also was made last year in improving concrete construction. One of the outstanding events was the staging of a week-long World Conference on Prestressed Concrete in San Francisco (ENR Aug. 8, 1957, p. 23). Participants came from all over the world, and the discussions covered almost every conceivable phase, from design theory through fabrication methods and erection procedures.

During 1957, use of prestressed concrete for buildings became widespread. The trend to factory production of shorter beams and on-site fabrication of longer members continued. Girder spans employed sometimes exceeded 100 ft.

In California, prestressed concrete was used for a number of state buildings erected by the lift-slab method (ENR July 4, 1957, p. 40). Either flatplate or waffle construction was used for floors and roofs.

Another indication of progress is the height record for lift-slab construction set in Mexico City last year. An 11 story apartment house was topped out at 101 ft (ENR Nov. 7, 1957, p. 67). But the record may not be long-lived: Plans have been announced for one 14 stories high in Hallandale, Fla.

But these are a far cry from the heights reached by conventional concrete construction. In Caracas, Venezuela, a contract was awarded for a reinforced concrete office and apartment building 58 stories high. Setting a new world's record, it will be 614 ft high (ENR Dec. 12, 1957, p. 74). The present record holder is a 507 ft high building in Sao Paulo, Brazil.

In Chicago, construction started on what will be the tallest concrete building in the U. S., a 40 story apartment house. It will rise to a height of 365 ft (ENR June 27, 1957, p. 39). And in Buenos Aires, Argentina, the 42 story, 410 ft high concrete Atlas building was completed.

• Thin curtain walls—Not only have changes been occurring in building shapes and framing but also in facades. The trend to thin curtain walls, for example, especially for tall buildings, might also be classified now as a shift.

An ENR survey of wall-panel fabricators indicates that use of thin wall panels continued to accelerate throughout 1957, and the expectations for 1958 are for continued rapid growth. Figures for square feet of panels installed last year could not be obtained. However, the fabricators did disclose relative gains in sales.

All replies were optimistic. Typical gains registered by porcelain-enameled steel panel suppliers were: 1957 up 30 to 40% compared with 1956; and 1958 to show an increase of 30 to 60%. For aluminum panels, installations rose 25% in 1957 over 1956, with a proportionate gain in square footage of walls color anodized. The increase for 1958 is estimated at 50%. Similar gains probably were made with other materials, such as ceramic veneer, glass, stainless steel and plastics, but no figures could be obtained.

There were no spectacular new developments in 1957 in the design of thin curtain walls. In general, they ranged in size from shallow spandrels to one-story panels with provision for windows. Units generally consisted of a frame and a spandrel facing with 1 in. of insulation.

The trend to greater use of color and to decorative designs impressed on metal panels continued.

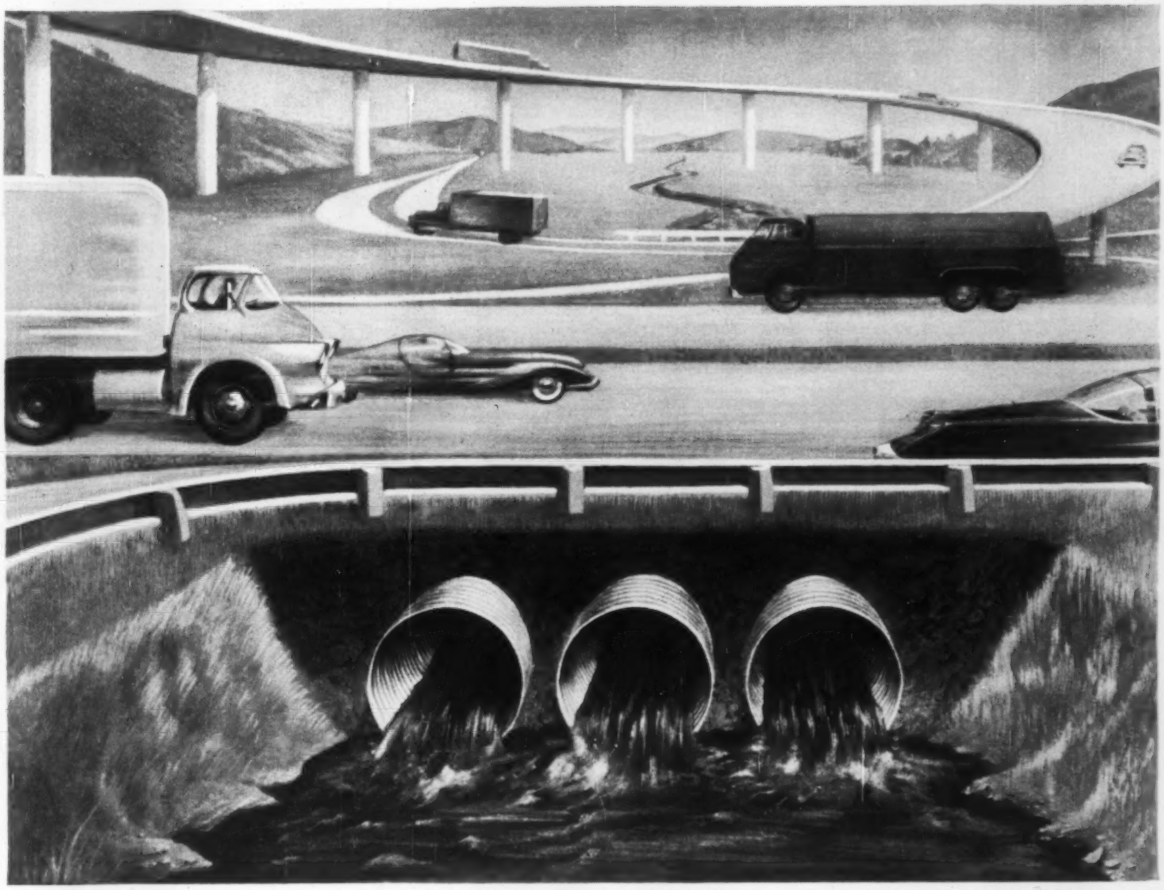
Usually, building codes required a fire-resistant backup in addition. (See, for example, ENR Nov. 21, 1957, p. 40.) However, the Seagram Building in New York City, completed last year, has floor to ceiling glass, with only narrow bronze spandrels between stories.

• Sun screens—Because of greater use of air conditioning, the trend to employment of some sort of exterior treatment to cut down solar heat gain was accentuated last year. Devices adopted varied:

For a sun screen for a Detroit building, Minoru Yamasaki called for a false front of gold-anodized aluminum mesh. Consisting of an interlocking system of aluminum rings 10½ in. in diameter, the screen will be set forward 5 ft. from the walls (ENR May 30, 1957, p. 29).

For a Beverly Hills, Calif., office building, John C. Lindsay, Los Angeles architect, employed vertical aluminum louvers that can be fully opened on cloudy days and closed for protection

(*Continued on p.* 114)



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Wheeling

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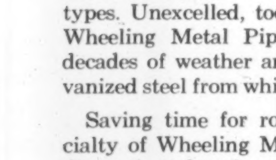

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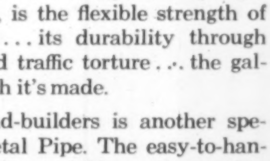

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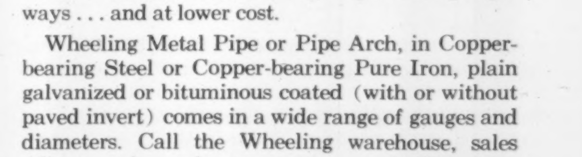
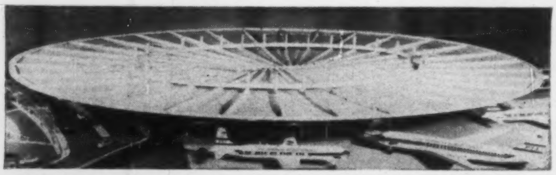
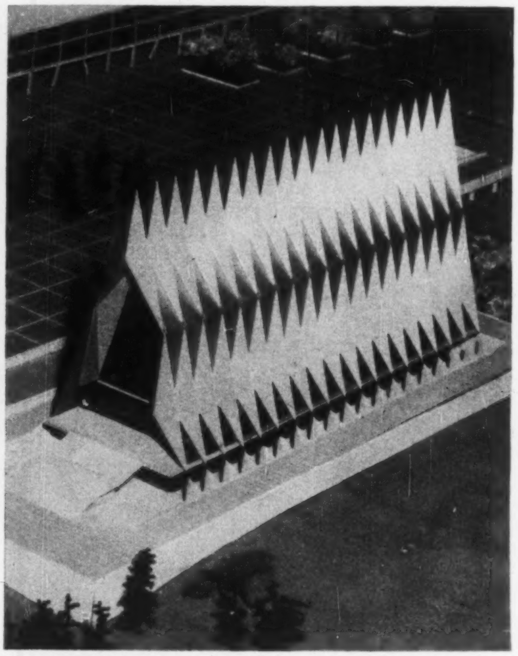


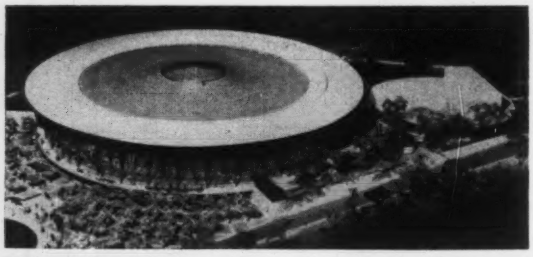
Wheeling warehouses, sales offices or culvert plants are in Atlanta, Boston, Buffalo, Chicago, Columbus, Des Moines, Detroit, Houston, Kansas City, Louisville, Madison, Martins Ferry, Minneapolis, New Orleans, New York, Peoria, Philadelphia, Richmond, St. Louis.



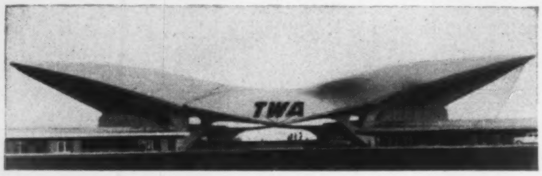
ELLIPTICAL BUILDING to be erected at New York International Airport will have a cable-suspended roof.



CONTROVERSIAL CHAPEL planned for Air Force Academy will have aluminum panels formed into tetrahedrons.



SUSPENDED ROOF of U. S. pavilion at Brussels World Fair resembles a spoked wheel in construction.



VAULTED ROOF planned for terminal building at New York International Airport will project out on two sides.

. . . Today's buildings presage tomorrow

during storms. Positioning to follow the sun is governed by an automatic time control mechanism (ENR Sept. 5, 1957, p. 28).

In Chicago, floor slabs were used as sun shades by architects Loebl, Schlossman & Bennett for a 15 story office building (ENR July 18, 1957, p. 33). For the purpose, the concrete slabs were extended beyond the walls.

Like eyebrows, short, lightweight concrete canopies were placed above each window in a 12 story office building in Tulsa, Okla. (ENR March 21, 1957, p. 26). The design was by McCune, McCune & Associates, architects-engineers.

And in several cases, balconies were provided on the exterior of apartment houses for the primary purpose of extending the living area to the outside but with the additional advantage of shading windows below from the sun.

• **New in housing**—One of the more spectacular developments in 1957 was the construction of a house made of plastics, to explore the possibilities of these materials (ENR Feb. 14, 1957, p. 25, and June 20, 1957, p. 28). Built in Disneyland, Calif., by Monsanto Chemical Co., the cross-shaped structure consists of a central core and four wings formed by eight curved panels faced with glass-fiber reinforced polyester resin and insulated with foamed urethane.

With the same purpose in mind, Monsanto also built a three-story research building in suburban St. Louis. More than 80 different applications of plastics can be found in this structure (ENR June 20, 1957, p. 56).

Another important research project started in 1957 was a test house sponsored by the National Association of Home Builders. Purpose of the structure is to check performance characteristics of new materials and construction techniques.

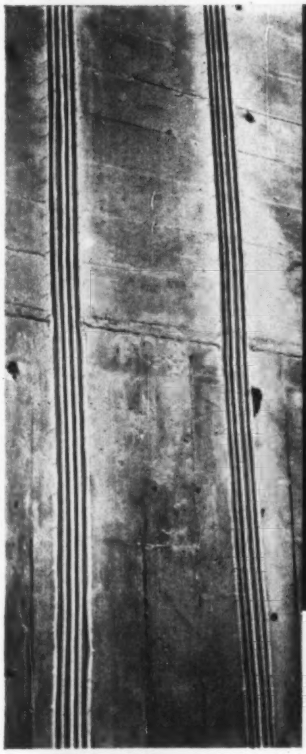
In the meantime no significant change was discernible in housing design and construction trends reported previously in ENR (Feb. 21, 1957, p. 106). However, home builders kept trying different techniques in the search for lower construction costs. For example, one found it expedient to completely sheathe his houses with plywood and then cut out openings for doors and windows. This technique eliminates the need for tacking a panel in place, scribing, taking it down, cutting the opening and finally nailing it up.

• **Lessons from troubles**—One trend discerned in 1957 is disturbing. While fire prevention methods are meeting with some degree of success, we are losing ground in the field of fire extinguishment. The National Fire Protection Association reported last year that fire departments are considerably undermanned, and though fewer fires occurred, they were bigger fires than in previous years.

Thus, it has become necessary that building designers give more thought to fire safety in their structures and to aids or substitutes for the fire department. The more automatic the device for fire extinguishment incorporated in a building, the better.

As usual, structural failures enabled the engineering profession to learn some significant lessons. Last year, a violent earthquake in Mexico City presented an excellent opportunity to learn about structural behavior, both from buildings

(*Continued on page* 117)



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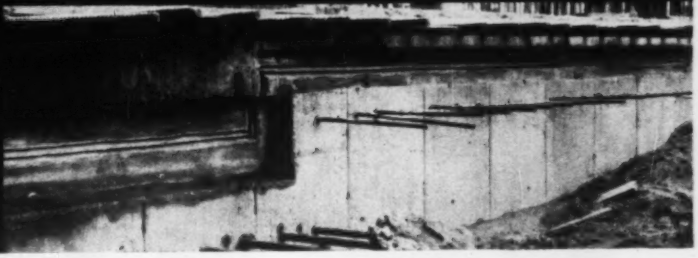

Indented pour. Normal agitation fills corrugated ribs.

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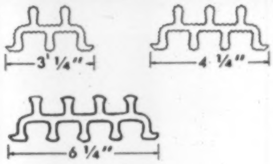
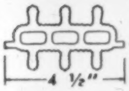
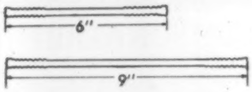


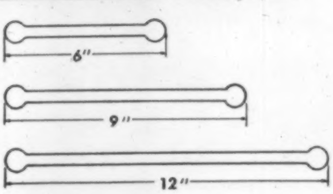
CELLULAR



FLEXTRIP



DUMBBELL



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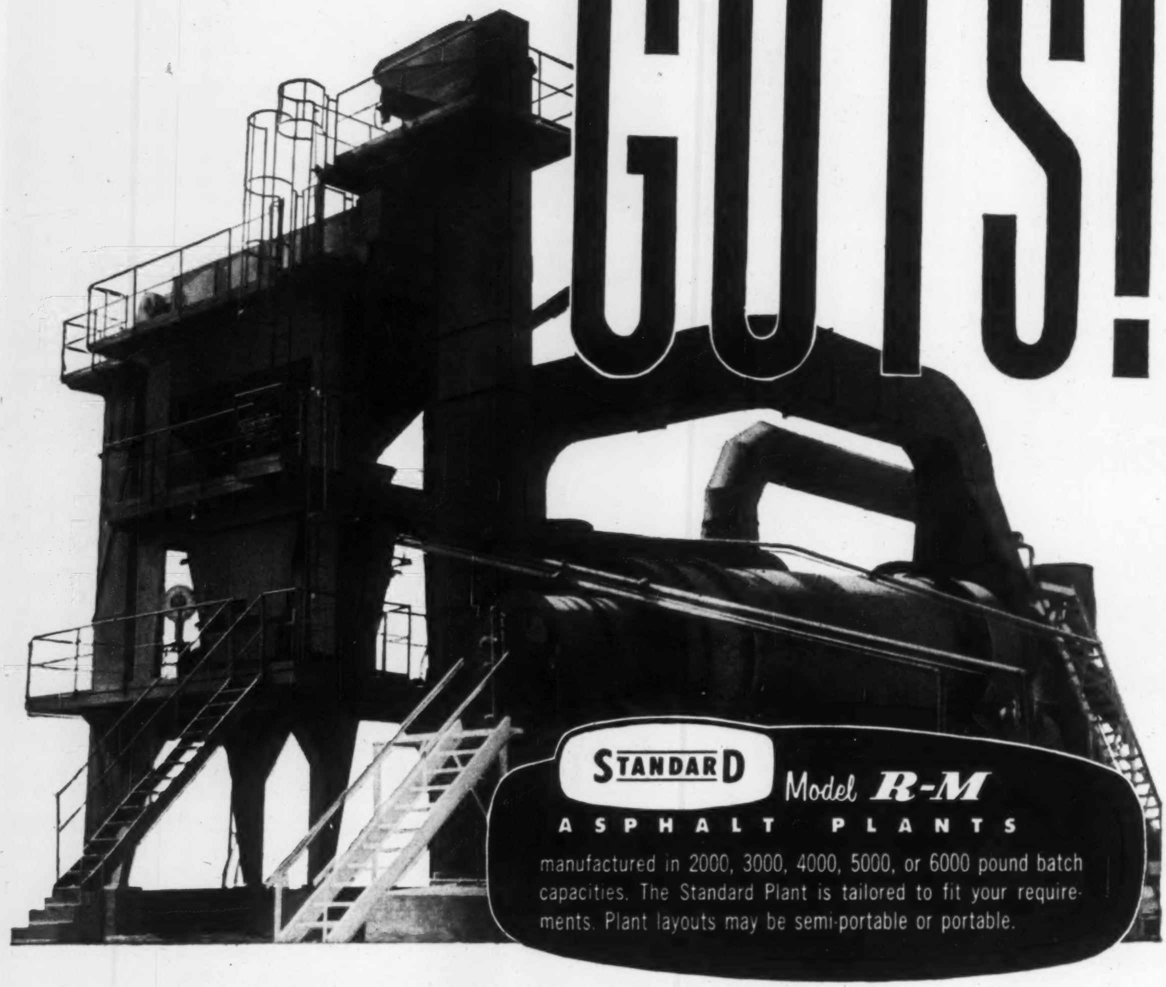

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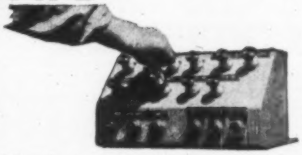

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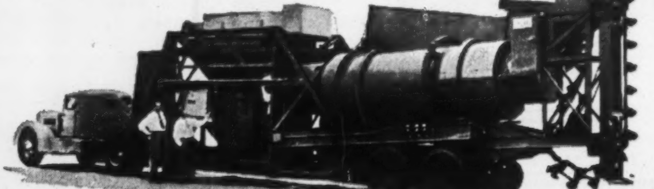


PARTS WAREHOUSES IN LOS ANGELES AND DECATUR, ILLINOIS that survived unharmed and those that were damaged.

Hitting the city in the early morning of July 28, the earthquake affected principally the taller buildings (ENR Aug. 15, 1957, p. 38). Few under five stories high were damaged if they had good foundations and were not pounded by adjoining buildings. Yet while buildings from ten to 25 stories suffered severely, a 43 story office building came through unscathed.

Generally, design and construction practices that obviously were faulty were responsible for much of the damage. But there was much that probably had not been clear previously.

For example, the following became evident after the earthquake: Sound design provisions in a building code are not enough; the code must also be enforced. In seismic zones, all components of a building should be rigidly connected to vibrate as a unit. Adjoining structures should be sufficiently separated so as not to strike each other, and consideration should also be given to possible subsurface interaction. Heavy masses poised on stilt-like columns usually offer poor resistance to seismic forces. Shear and moment connections between columns and floor framing may have to be heavier than dictated by present codes (ENR Aug. 22, 1957, p. 128, Sept. 5, 1957, p. 160).

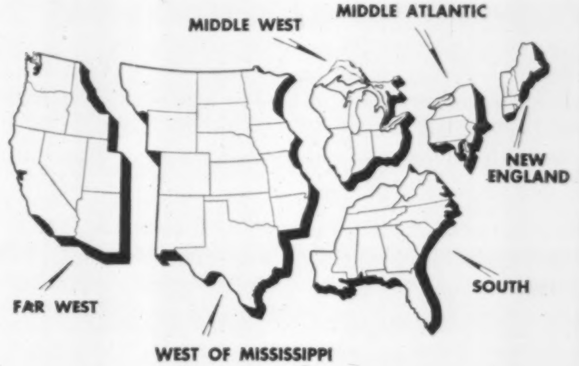
As a consequence, Mexico City stiffened its requirements for seismic design. The revision calls for higher design coefficients for computing seismic shears and assumes linear variation of accelerations in determining shears at various levels. It places limits on lateral deflections. It incorporates provisions for torsional resistance. In addition, it requires that consideration be given to subsurface conditions, type of occupancy, height of building and type of construction in selecting seismic coefficients (ENR Oct. 17, 1957, p. 69).

Also last year, new light was shed on the cause of brittle failures by the results of research published in two new books. The reports made clear that if this type of failure was to be avoided, the following courses were open to designers: 1. Use low stresses. 2. Avoid notch effects and high local stress concentrations. 3. Select a material with high notch toughness. 4. Insist on sound workmanship and suitable inspection and supervision. 5. Choose the proper fabrication process. (ENR Aug. 8, 1957, p. 67 and 128).

Looking back at what took place in buildings and housing in 1957, we can conclude that even there were many spectacular developments, and substantial progress was made toward better construction. And with the stage set by last year's solid accomplishments, prospects are at least as bright for 1958.

Major Building Projects

Grouped geographically according to the regional boundaries shown at right, outstanding U. S. building projects are described below.



New England

• **Connecticut General Life**—The new $19 million headquarters of Connecticut General Life Insurance Co. was occupied last April. Located a few miles outside Hartford, the project includes three, steel-framed, glass-walled buildings—a three-story main building, a four-story and penthouse executive wing, and a 1 story cafeteria. Floor space totals over 500,000 sq ft.

• **State Mutual Life**—Completed and occupied during 1957, the new $10 million headquarters building of State Mutual Life Assurance Society of America, in Worcester, Mass., is a four-story 500,000 sq ft building faced with pink granite. Each of three floors incorporates a 45,000 sq ft post-free area.

• **Yankee Atomic**—Major construction will begin this spring on Yankee Atomic Electric Co.'s 134,000 kw nuclear power plant at Rowe, Mass. Preliminary construction began last October, and completion is expected in late 1960.

• **Yale hockey rink**—Construction is well advanced on Yale University's David S. Ingalls hockey rink at New Haven, Conn. The roof of this unconventional structure is supported by cables sloped down from a central longitudinal reinforced concrete arch rib—the backbone of the building—to the side walls, which bow out to provide arch action in resisting the inward pull of the cables. Wood nailers will be fastened to the cables and wood plank will be used to roof the building.

• **Commerce Oil Refinery**—Clearing of a 600 acre site on the northern tip of Conanicut Island in Narragansett Bay near Providence, R. I., was begun late last year to make way for construction of a $50 million refinery for Commerce Oil Refining Corp. Completion date for the 43,000 barrel-per-day refinery has been set for early summer of 1959.

Middle Atlantic

• **Chase Manhattan Bank**—The superstructure of this 60 story office building in New York City's financial district is now rising. By the use of chemical grout to solidify unstable water-bearing strata, it was possible to eliminate all pneumatic caisson work.

• **Penn Center**—Now being enclosed in this $100 million commercial development in Philadelphia is the second Uris Bros. building, a 20 story, 450,000 sq ft office structure just like the first Uris building, completed earlier. Other completed buildings are the Sheraton Hotel and the Transportation Center, which includes an 18 story office building, a bus terminal and a three-story garage.

• **Pittsburgh auditorium**—Bids on Pittsburgh's new $17 million auditorium with a retractable roof were to be opened after ENR went to press this week. The structure's dome roof will

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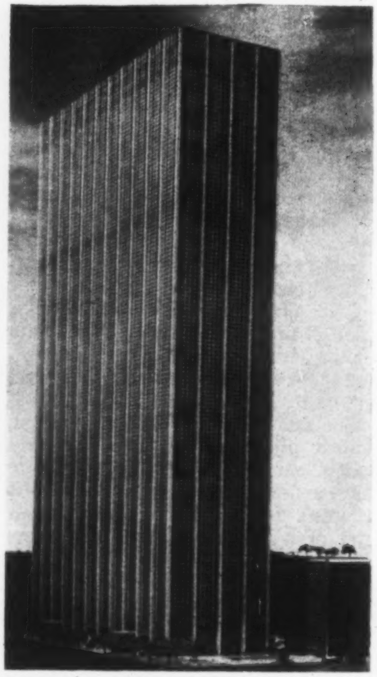

TIME-LIFE BUILDING will be a 47 story addition to midtown New York skyline.

be a steel-framed metal shell divided into sections that can be rolled behind one another like multiple-leaf rolling doors, opening up three-quarters of the interior to the sky.

- **Flying-A Refinery**—The $200 million Delaware Flying-A Refinery for the Tidewater Oil Co. was finished last May. Situated on a 5,000 acre tract 15 miles south of Wilmington, Del., the new construction includes the largest (130,000 barrels a day) petroleum refinery installation ever built at one time. A 50,000 kw power station, 11 processing units, and an eight-building "business section" were also part of the overall project. Two years under construction, the job took 20 million man-hours to complete.

- **Pittsburgh Plate Glass Co.**—Works No. 7 at Cumberland, Md., was completed and put into production last year. The $56 million plant is three-quarters of a mile long. The buildings are steel-framed with concrete floors; concrete spandrel walls with insulated corrugated asbestos cement above; and insulated metal roof deck.

- **New York City schools**—The Board of Education opened 21 new schools with a construction cost (buildings only—no furnishings) of $41 million during 1957. Under construction at the end of the year were 56 projects esti-

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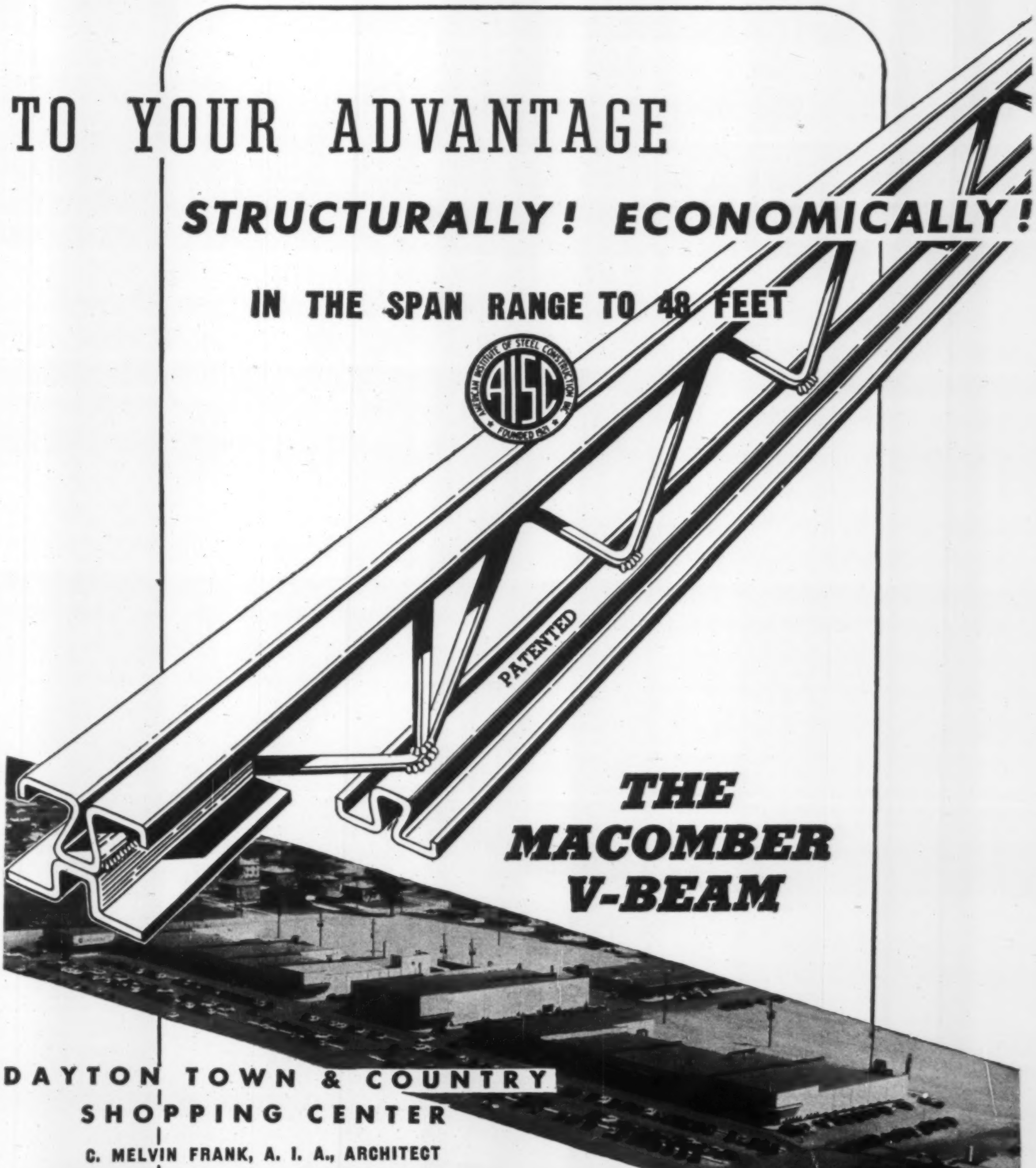
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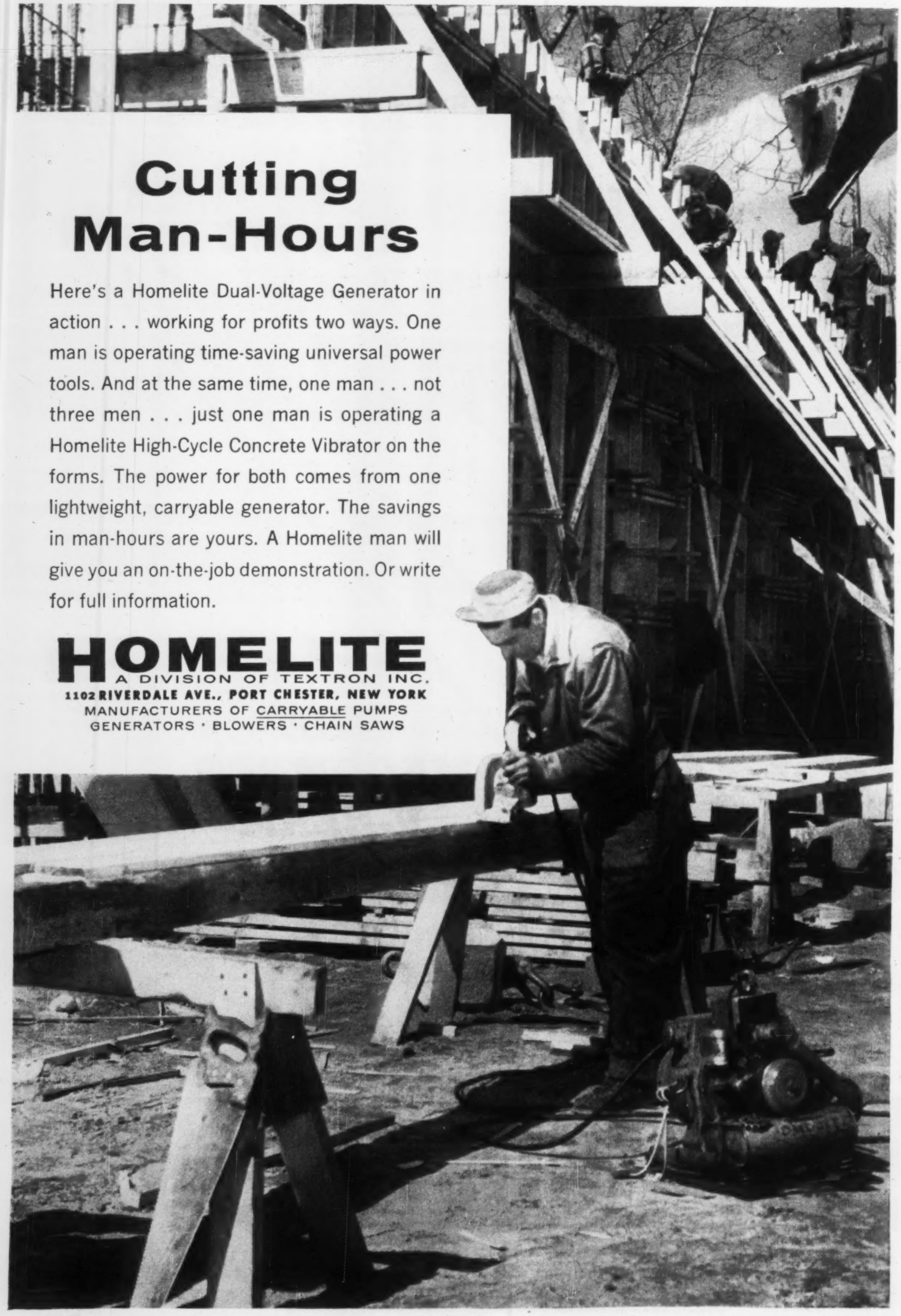

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BIGGEST OIL REFINERY ever built at one time is part of Tidewater Oil Co.'s $200 million, 20 million man-hr Delaware Flying-A Refinery, near Wilmington, Del.

mated to cost $160 million. Nine of these will be completed within the next few months. The top projects under construction during the year were five high schools with a total cost (again, buildings only) when they are completed of just under $31 million: Edison Vocational, Sheepshead Bay High, Bronx H. S. of Science, Printing Trades High (with glass block exterior walls) and Aviation Trades High School (with its own hangar).

• **New York City Housing Authority**—Last year the Housing Authority awarded construction contracts totaling $56 million, completed 7,500 apartments, started construction of 4,880, and placed 450 in design. At the end of the year, 10,980 apartments were under construction, and 28,700 were in design. Biggest project started during the year was Castle Hill Houses, in the Bronx. Begun in June, the first of its 2,025 apartments are expected to be ready for occupancy this fall.

• **Idlewild hangars**—Besides Terminal City, which is covered in another item, New York International Airport's major building projects of 1957 are three $15 million hangars and a $5 million, 320 room hotel, all still under construction. The hangars are being built for Pan American World Airways, Trans World Airlines and American Airlines. American's building is a double-cantilever type, with steel trusses extending 140 ft each side of a steel-framed center section. The other two also have unobstructed overhangs on each side of a center section, but they are reinforced concrete, and the side roofs are folded-plate type, supported near their outer edges by overhead cables tied back to anchor walls that rise above the center section. The Pan American hangar has 130 ft overhangs, the TWA structure 150 ft.

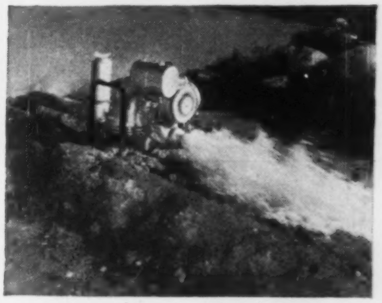
• **Seagram Bldg**—This 38 story New York City office building, now virtually complete, is distinguished by a bronze-metal exterior and pink-gray windows. Also it is probably the tallest bolted-frame building in existence.

• **Guggenheim Museum**—Roof construction is now under way on the Guggenheim Museum in New York City, a $3 million reinforced concrete building with a spiral ramp instead of conventional floors. The ramp makes six turns, rising 11 ft per turn. Works of art will be displayed along the curved walls.

• **Commercial Credit Corp.**—The 20 story, air-conditioned Commercial Credit Bldg. was completed late last year in downtown Baltimore. Faced with aluminum panels 12 ft high and 7 ft wide, the structure has a bolted steel frame.

• **Washington Square Village**—The first of three 17 story middle-income apartment houses in this $75 million Title I project in New York City is scheduled for fall occupancy. The remaining two

Full Line of Carryable Construction Equipment Now Offered by Homelite



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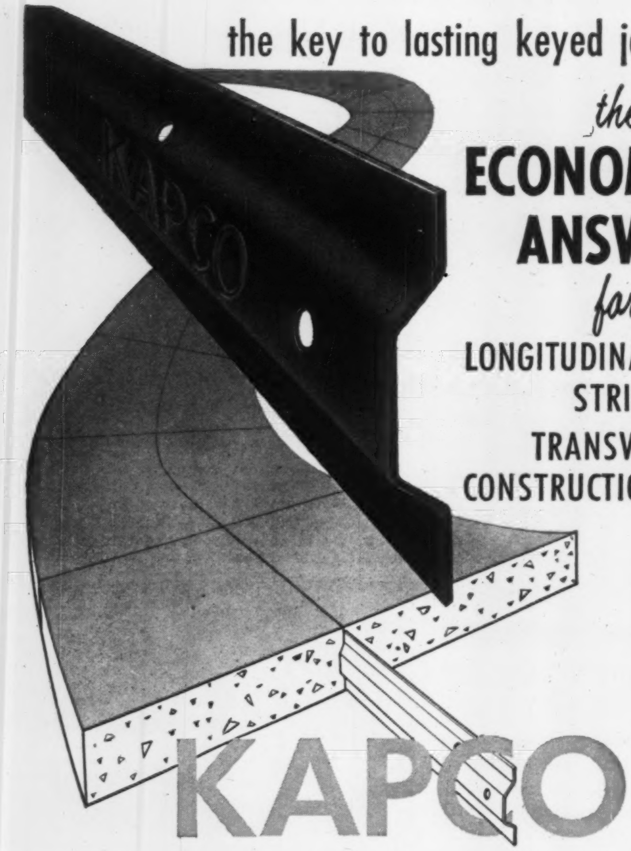

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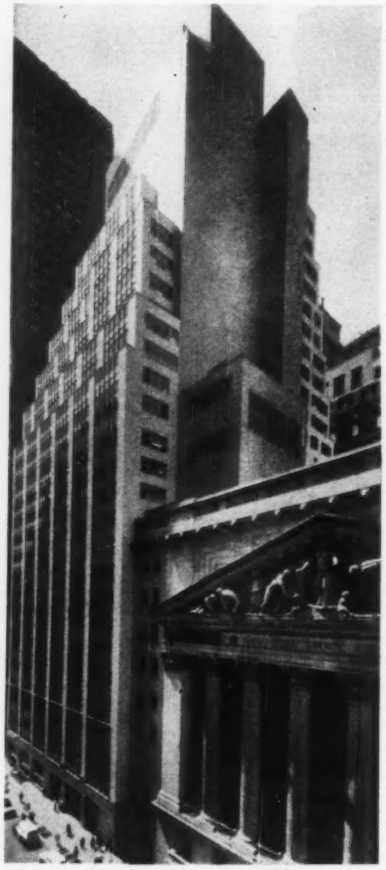


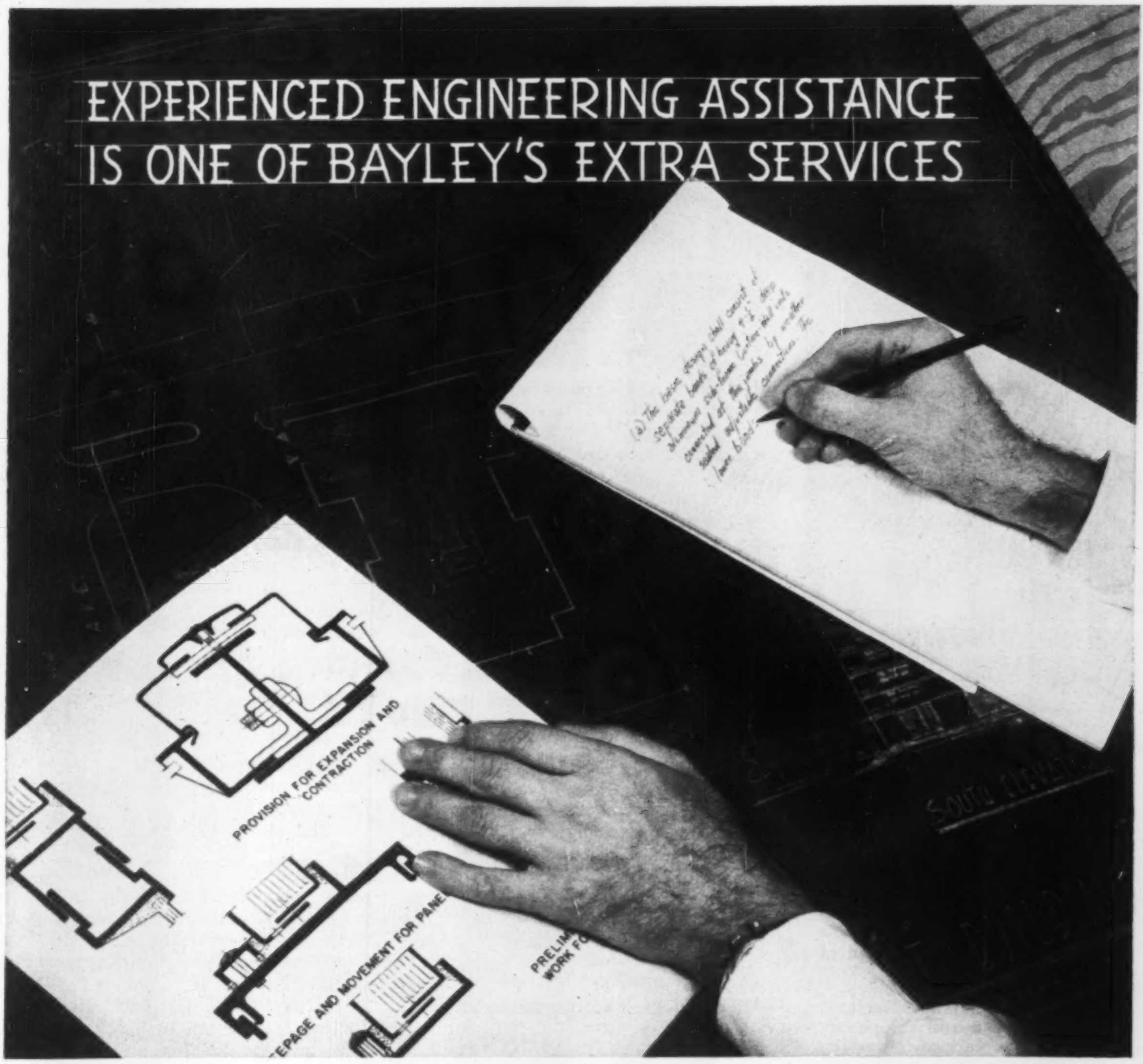
WELDED FRAME SKYSCRAPER has 5th floor plate girders carrying top 22 floors.

will be completed one and two years later. Located on a 12 acre site, the project will have 2,000 apartments.

- **Roosevelt Raceway**—A lavish new clubhouse and other improvements were completed last year at a total cost of about $20 million at this Long Island, N. Y., harness racing track. The 800 x 200 ft clubhouse is almost completely glass-enclosed and air-conditioned.

- **666 Fifth Ave.**—Completed and dedicated last November, this $40 million, 38 story New York City skyscraper contains more than a million sq ft of rentable office space behind its aluminum-paneled walls.

- **Capitol Hill**—By summer the new seven-story Additional Office Building for the U.S. Senate will probably be complete. Situated on Capitol Hill directly east of the existing Senate Office Building, the structure and grounds are to cost about $24½ million. First construction bids on the new House Office Building will be taken shortly. This phase of the job—excavation, sheet pil-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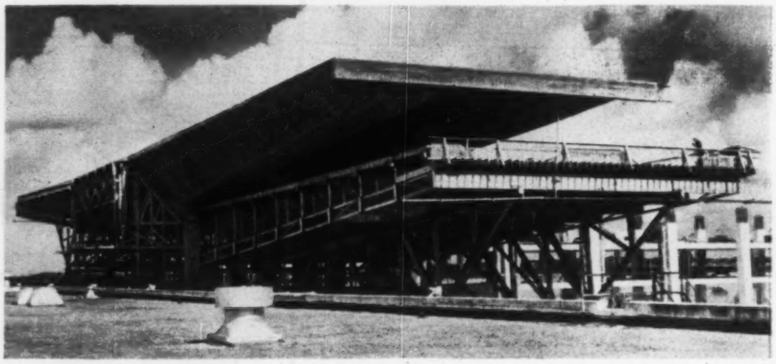

FOLDED-PLATE CONCRETE roof cantilevers 111 ft on either side of a 48 ft wide center structure in National Airlines' hangar, nearing completion in Miami.

ing, foundations and an underground garage—will run $8-10 million. The over-all job—to be completed in 1961 or 1962—will cost about $65 million. There is a possibility that to avoid delays the Capitol Architect's office will let the structural steel contract before taking construction bids on the superstructure. The projected $18 million job of remodeling the existing House office buildings might be started on one of the two this year. The work involves difficult scheduling to minimize conflict with occupancy.

• **20 Broad St.**—The 27 story welded-frame skyscraper next door to the New York Stock Exchange was completed last year. Story-high plate girders carry the building frame above the fifth floor and make possible a new post-free, third-story trading floor for the Stock Exchange, which is a tenant.

• **111 W. 40th St.**—The new 34 story office building nearing completion at Avenue of the Americas and 40th St. in New York features pier facings of white ceramic veneer—reputedly the first major use of terra cotta facing on a skyscraper since construction of the green-tiled McGraw-Hill Building on W. 42d St. in 1931.

• **Temple Emanu-El**—This Englewood, N. J., synagogue, completed in 1957, has an elliptical section 60 x 44 ft with wall and roof framing consisting of 22 glued-laminated wood arch ribs spaced around the perimeter and meeting along the sides of a short ridge beam at the center.

• **Trans World Airlines**—TWA has just about finished casting the cable suspended folded-plate concrete roof of its $12 million hangar at New York International Airport. Spreading 150 ft on each side of an 80 ft wide three-story center building, the roof sections are supported at one end by the center building and near the outer end by cables anchored in walls that rise above the top of the center building.

• **N. Y. Daily News Bldg.**—Foundations are in for the 18 story addition to the Daily News' existing 37 story building on E. 42d St. in New York, and some steel work has begun.

• **575 Lexington Ave.**—The bolted steel frame of this 34 story skyscraper office building at 51st St. in New York City was topped out late in the year and erection of the gold-anodized aluminum exterior was begun. Enclosure of the $15 million 528,000 sq ft structure is expected to be completed this month.

• **Brooklyn Civic Center**—With occupancy scheduled for this fall, the 12 story $17.8 million Supreme Court Bldg. is about ready to join the Civic Center's completed list, which now includes the House of Detention for Men, Red Cross Bldg., Domestic Relations Court, Transportation Bldg., Welfare Bldg. and World War II Memorial.

• **Indian Point Power Station**—Consolidated Edison Co. of New York began work on its Indian Point nuclear power plant in December, 1956, and expects to complete it by December, 1960. The gross capacity of 275,000 kw will be generated partly by the reactor (163,000 kw) and partly by an oil-fired superheater (112,000 kw). Net capacity will be 255,000 kw.

• **Shippingport nuclear power**—Under construction since March, 1955, Duquesne Light Co.'s power plant at Shippingport, Pa., the country's first full-scale commercial nuclear power plant, began producing power last December. Before the end of the year full output of 68,000 kw gross was reached.

• **Mutual Benefit Building**—A new home office building completed last fall

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B.F.Goodrich Tubeless construction runs cooler, protects against punctures, cuts maintenance costs, is easier to service.

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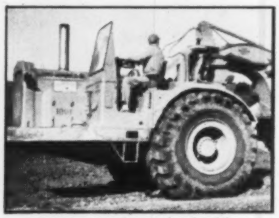
No unnecessary failures thanks to bruise-resistant tread and sidewalls, uniform flexing, cooler-running tubeless construction.



Greater traction—the double-chevron tread digs in and pulls in forward or reverse. Sharp cleat angles defy dangerous skids.

FLEX-RITE construction means the Rock Service is not distorted when inflated. No tire-killing stresses. Instead, uniform flexing.

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BORG-WARNER BLDG., Chicago, is walled with blue porcelain-enameled panels.

is the biggest unit in Mutual Benefit Life Insurance Co.'s $20 million building program in downtown Newark, N. J.

- **Record-span wood arches**—Island Garden Arena, completed during 1957 in West Hempstead, N. Y., boasts the longest span wood barrel arches ever fabricated. The main ribs span 250 ft and have a rise of 67 ft.

- **Air Terminal City**—New York International Airport's $150 million Terminal City went into operation in December on completion of the $30 million, steel-framed, glass-walled arrivals and wing buildings for overseas air traffic. Also completed are extensive roadway and parking facilities and a central heating and refrigeration plant, which incorporates the biggest installation of absorption cooling equipment in existence—nine 705 ton units. Yet to be built are six individual terminals for major U.S. air lines, some of which have started work.

- **Union Carbide headquarters**—Demolition of the Marguery Hotel was completed last year in New York City on the Park Ave. site of Union Carbide Corp.'s new $46 million home office building, and foundation work was begun. Steel construction was started last month for the 52 story structure. The exterior will feature stainless steel mullions and gray-tinted glass.

- **State Dept. Bldg.**—Under construction since last summer, the State Dept.'s new $57 million office building in Washington will contain 2½ million sq

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TESTS PROVE CROSS-SECTION DESIGN OF DURAJOINT WATERSTOP TO BE FAR SUPERIOR!

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* Journal of American Concrete Institute, Discussion 52-7, V. 28, No. 6, Dec. 1956, Part II, Proceedings V. 52, Page 1151

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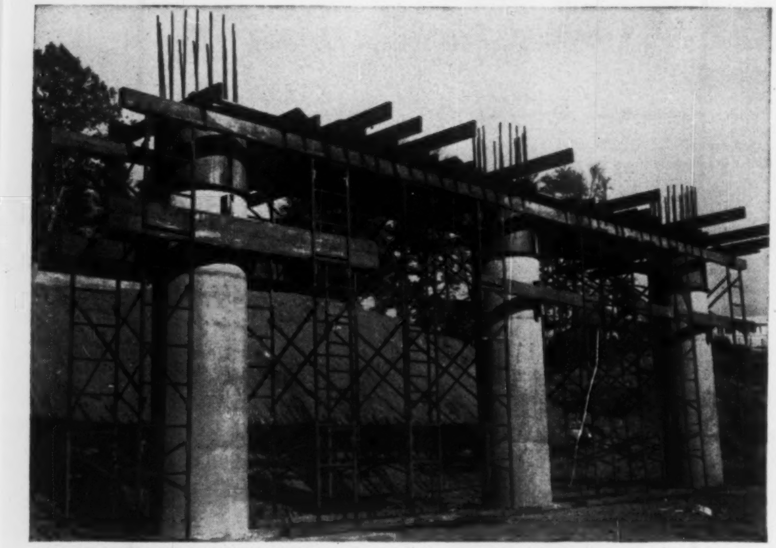
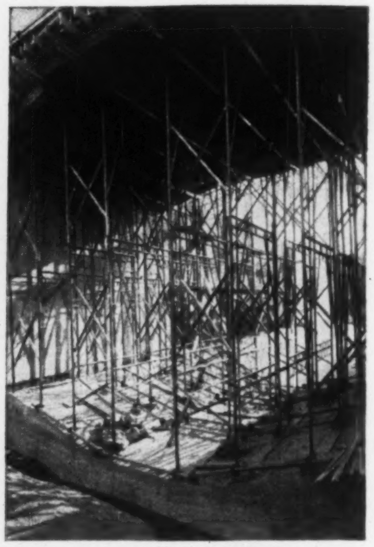
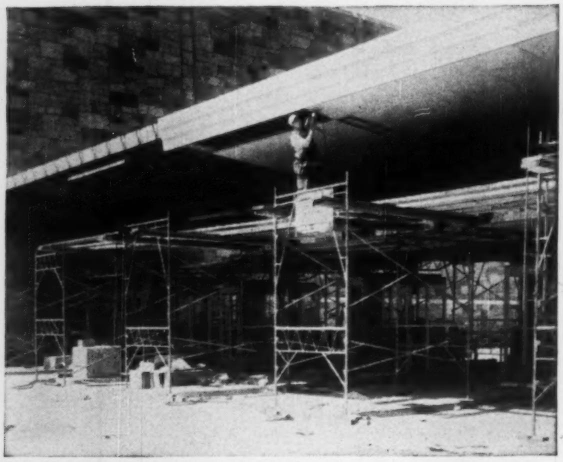


QUICK PIER BEAM SUPPORT—"Trouble Saver" 2′-wide Ladder Scaffold frames spaced 5′ apart help contractor, M.D.A. Construction Co. provide easy access for forming work and support for one of 20 bridge piers on the Cross-Westchester Expressway, White Plains, N.Y. This photo shows forming and support for a pier beam 42″ x 48″ deep, 14′ high. Many users of "Trouble Saver" Shoring say "its ease of handling means quicker job completion." Complete, accurate shoring layouts are a regular part of PS Co's engineering service available thru nation-wide offices or representatives that *sell* or *rent* "Gold Medal"® Scaffolds.



CONFORMING TO CURVES—Guy F. Atkinson Co., contractor, uses "Trouble Saver" Shoring to support Pacific Electric Ry. Co. concrete bridge, Los Angeles, over a sloped concrete channel base. Adjustable legs help meet both curves, top and bottom. Note 4″ steel I-beams as stringers, furnished by PS Co.

Shoring Methods . . . for Highway Construction by The Patent Scaffolding Co., Inc.



FINISHING OPERATIONS—On toll booths at the New Jersey Plaza for the New York—New Jersey Lincoln Tunnel these "Trouble Saver" fixed Scaffolds are used to provide safe, level platforms for finishing work. The scaffolding components used here are the same as those used for shoring operations. By assembling them in towers and spacing to take the load, practically any shoring job can be done.

EASILY HANDLED BRIDGE SHORING—5′-wide prefab "Trouble Saver" Sectional Steel Shoring frames are handled easily by the crew for T. M. Page and RCT Corp., joint venturers, to obtain the correct support for the Cajon Blvd. Bridge over Devil's Creek Diversion Channel, San Bernadino, Calif. Two 6′6″-high frames, with extension legs, give 14′ height. 4″ steel I-beams used as stringers. 3′7″ spacing between frames.

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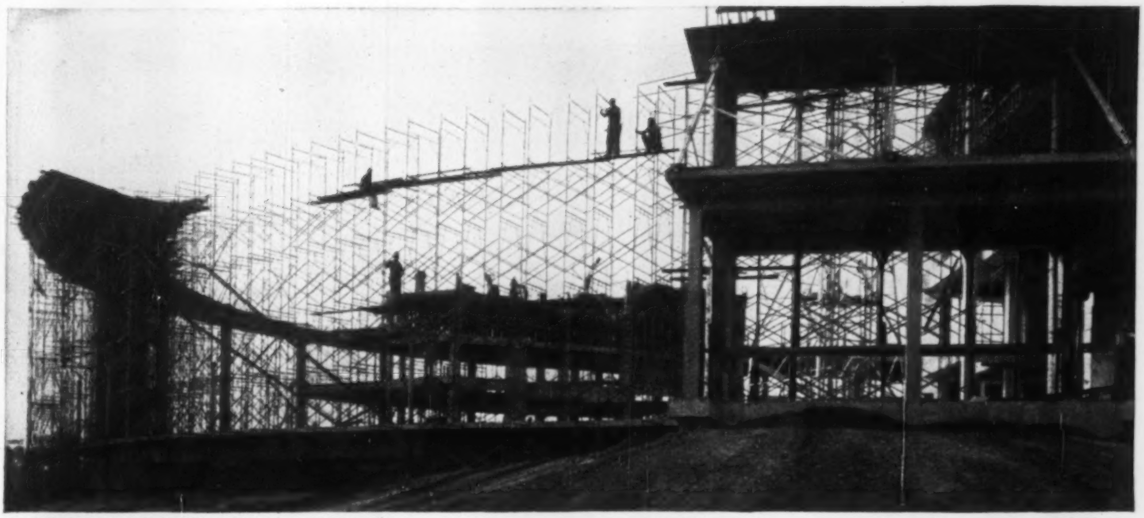
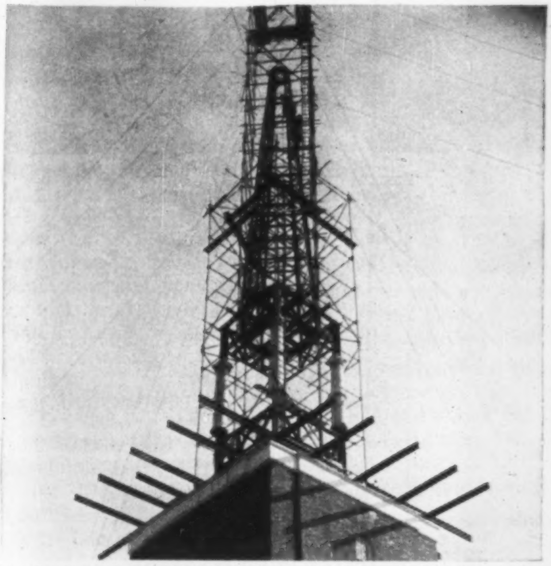
To help you with your scaffolding and concrete shoring methods, PS offers a complete nation-wide engineering service available to you locally. See the Yellow Pages in your 'phone directory for the nearest Patent Scaffolding office or representative that sells and rents "Gold Medal" Scaffolds.

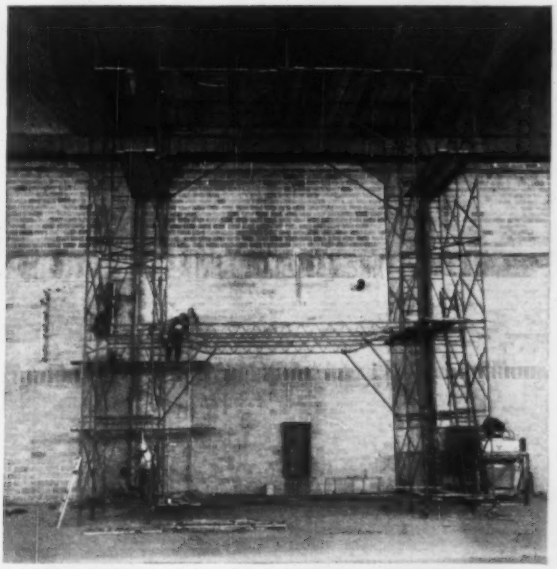


SUPPORTS 270′ CONCRETE CANOPY—Handling form work and providing support for circular concrete canopy around the new Municipal Auditorium, Austin, Texas, is simplified for contractor, J. J. Stokes Construction Co., by the use of modern prefab "Trouble Saver"® Steel Shoring. 580 frames are quickly and easily assembled to provide the shoring needed. Planking laid across the tops of frames also provides working platforms. By using this shoring technique the contractor cuts forming costs all along the line. "Trouble Saver" frames are 5′ wide and range in height from 3′ to 10′, providing broad application variations to meet any scaffolding or shoring job for efficient, lower cost construction.

Scaffolding Methods . . . by Patent Scaffolding Co.



TWO-STAGE SCAFFOLDING—Contractor, Miller Davis Co., uses 3870′ of "TubeLox"® Scaffolding for building a steel roof on this 215′ spire. After upper portion is done, scaffold is dismantled and re-erected on the I-beams for heavier lower work. New Goodrich Mem. Chapel, Albion, Mich. Made with only four basic parts, this scaffolding is erected rapidly to conform to any shape, size or contour. Variable tube lengths, from 6′ to 20′, and adjustable couplers assemble to meet job conditions.



ELECTRICIANS' ROLLING TANDEM SCAFFOLD—These two towers are each made of five sections of 6′6″ "Trouble Saver" Scaffolding frames set on casters, truss-joined at two points and braced at the bottom with "TubeLox" Scaffolding. They permit the contractor, J. Livingston & Co., to roll along 33′6″-high for electrical work on hangar #12, Idlewild Airport, N. Y. C. "Trouble Saver" Scaffolding accessories permit unlimited scaffolding design and use.

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Facts on how to cut forming costs at least 25% are fully described in special booklet, "How to Use Steel Shoring and Scaffolding in Highway Construction". *Check coupon for Bulletin G208.*

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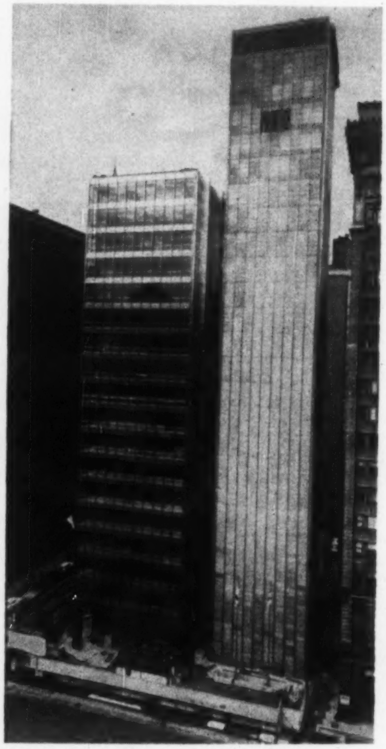

INLAND STEEL BLDG. in Chicago, has 30% stainless-steel and 70% glass walls.

ft of gross floor area, ranking it second in size—after the Pentagon—among all federal office buildings.

• **Interchurch Center**—Ground was broken in New York last November for a 19 story, steel-framed, limestone-faced building to be occupied by a number of Protestant religious organizations. Gross area of the structure will be 690,000 sq ft, cost will be $20 million. Completion is expected late next year.

• **Atomic Energy Commission**—The final wing of the AEC's four-story headquarters near Germantown, Md., is under construction now. The remainder of the building is complete and scheduled for occupancy early this year.

• **Tower of glass**—Foundations are complete and steel erection has begun for the Corning Glass Works Building, on the southeast corner of Fifth Ave. and 56th St. in New York. The structure will be 28 stories high and will contain 365,000 sq ft of office space. The exterior will be glass.

• **Time-Life Building**—Excavations were nearly finished and foundation work had begun when the design features of this $70 million building were announced in November. Vertical bands of limestone will run the full height of the 47

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95% of large buildings erected in recent years are HIGH STRENGTH BOLTED

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Almost everybody prefers this advanced construction technique to riveting. Engineers like it because bolted joints are stronger and stay tight permanently. Contractors find the speed of fastening chops construction costs. Ironworkers are rid of the danger of hot rivets. Neighbors appreciate the quiet.

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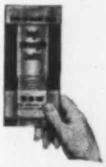
RB&W high tensile bolts have been a key element in the overwhelming approval of this construction method. They provide connections with high shear and tensile strength . . . stay permanently tight under *all* kinds of loads. These high quality fasteners conform to ASTM specification A325, assuring absolute reliability in joining buildings, bridges and equipment.



For more details, look up the RB&W Catalog in Sweet's Industrial Construction File, or write for copies of this informative bulletin. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

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Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver, Fargo. **Distributors** from coast to coast.

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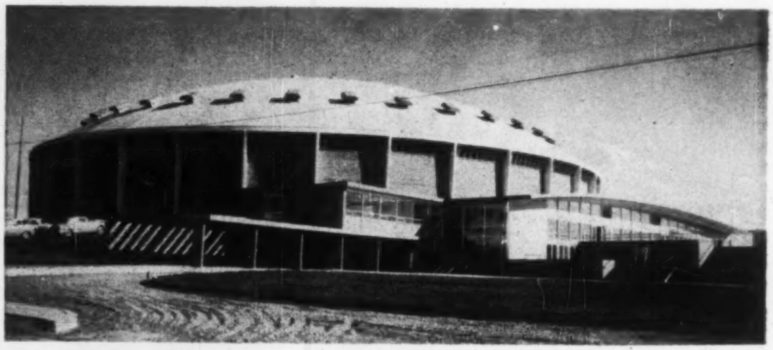


BIG TIMBER DOME covers 300 ft dia post-free arena in Montana State College's new field house. Framework of the structure is glued-laminated wood ribs and purlins.

story structure, with glass and aluminum between. It will occupy the block front between 50th and 51st Streets on New York City's Avenue of the Americas.

• **750 Third Ave.**—Spring occupancy is scheduled for this 34 story office building at 47th St. in New York City. Built at a cost of $25 million, it is connected at street and basement levels to a companion building 30 stories high, erected in the same block a year earlier.

• **Social Security building**—Now being built just outside Baltimore under a $20.9 million contract awarded in November, the headquarters of the Bureau of Old-Age and Survivors Insurance will consist of two main buildings ten and five stories high, with a connecting link. Gross floor area will be 1.4 million sq ft.

• **100 Church St.**—Started last June, this $28 million 20 story office building will be ready for occupancy in June of this year. It occupies a square block and will contain about 1 million sq ft of space.

South

• **Arnold Center**—The Air Force's Arnold Engineering Development Center at Tullahoma, Tenn., is about 80% complete after seven years of construction and expenditure of $200 million. Contracts in work at the end of the year totaled $27 million. It was anticipated that from then till the end of the fiscal year June 30, payments would add up to $9 million, and $12 million in new contracts would be awarded.

• **Appalachian Power**—One 225,000 kw generating unit at Appalachian Electric Power Co.'s new $55 million Clinch River steam plant in western Virginia is expected to go on line this summer and the second in the fall. About 95% of the structural steel work in the plant was complete at the end of 1957, and the cooling towers, substation, and office section are just about finished.

Meanwhile construction is under way on a $58 million, 450,000 kw addition to the Philip Sporn plant at Graham Station, W. Va., owned jointly by Appalachian and the Ohio Power Co. The new units will boost this plant's capacity to 1.05 million kw.

• **Widow's Creek steam plant**—Construction of an $86 million addition to the Tennessee Valley Authority's steam power plant at Widow's Creek, Ala., is scheduled to start this spring.

• **Memphis power**—The City of Memphis, Tenn., began work on its power plant last June and has completed about one-third of it. Bond issue for the project was $181 million.

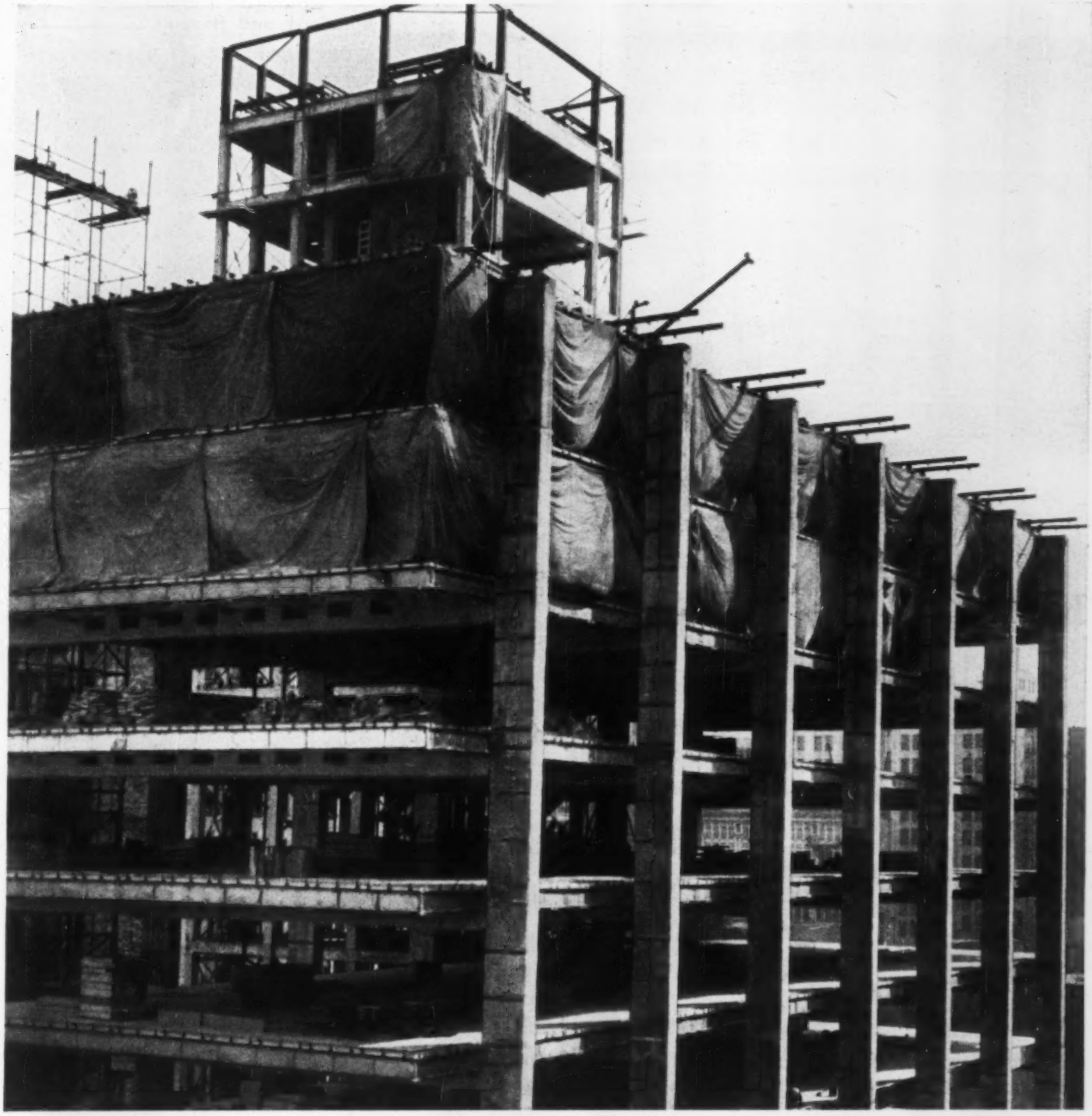
• **Reynolds Aluminum Co.**—Reynolds' new $10 million aluminum and glass-walled office building in Richmond, Va., with outside louvers that adjust automatically according to the sun's position, is about 85% complete. Occupancy of the four-story, 300,000 sq ft building is scheduled for May.

• **Olin Revere Metals Corp.**—Begun late in 1956, Ormet's $51 million alumina plant at Burnside, La., is just about complete now. Capacity at full production will be 385,000 tons a year.

Middle West

• **Illuminating Bldg.**—Cleveland's first major office building erected in 25 years was completed in 1957. The 298 ft high structure is one of the tallest reinforced concrete buildings in the U.S.

• **Aluminum metropolis**—By the end of this year, Olin Revere Metals Corp.'s $107 million alumina reduction plant at Omal, Ohio, (near Hannibal) will be turning out aluminum ingots for the parent firms, Olin Mathieson Chemical Corp. and Revere Copper & Brass, Inc.



INLAND SECURITY—This ultra-modern Inland Steel Building, erected by the Turner Construction Company, towers 19 stories above the heart of Chicago. The first major building ever designed with exterior supporting columns, it provides an unincumbered area of over 10,000 sq. ft. on each floor. Since much of the construction was undertaken during the cold winter months, sturdy tarpaulins were essential to protect the workmen and exposed areas of the building from this rugged weather. Selected for the job were tarpaulins of Mount Vernon duck, made by M. Mauritzon & Co. and supplied by W. W. Lee & Son, Chicago.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

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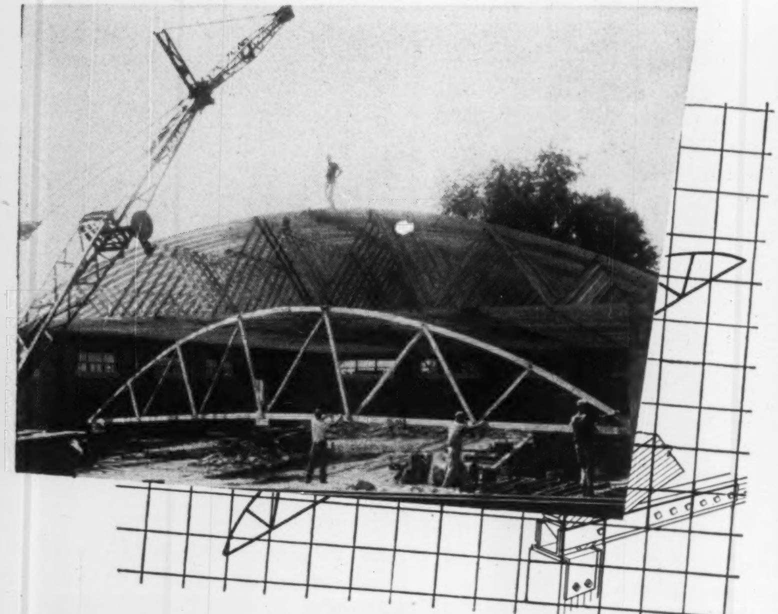


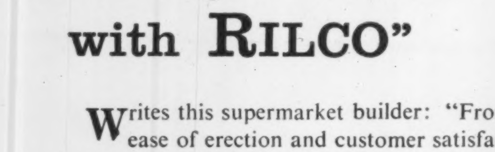
"Entirely satisfied with RILCO"

Even large Rilco trusses like these go up fast and easy, need no fitting, sawing, drilling at the jobsite. These are trussed arches 71' 4" x 124'.

Writes this supermarket builder: "From the standpoint of costs, ease of erection and customer satisfaction we were entirely satisfied with the RILCO materials and with this type of roof structure."

Builders everywhere comment on their satisfaction with RILCO laminated wood bowstring trusses, tied and radial arches and beams. Biggest item with them is, of course, the accurate fabrication of RILCO members, for each is carefully engineered to exact specifications. They arrive at the jobsite ready for erection, with holes drilled for connection hardware furnished. RILCO buildings go up in jigtime—your regular crews erect them fast, saving you days—and dollars. Builders everywhere report successful profitable results—even on their very first RILCO job.

And RILCO laminated members find favor with clients too. They have a low price tag to start with—then because they cannot corrode or rust they slash maintenance costs through the years. Supermarket, factory, garage, warehouse, church, school—whatever your project RILCO can help you build it bigger and better for less.



A & P Supermarket, Sunset Park, Williamsport, Pennsylvania.
Contractor: George H. Roller Company, Inc., Williamsport

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DIAMOND-SHAPED building is Union Oil Center's main section, Los Angeles.

Annual output will be 180,000 tons. To be completed at the same time on the 1,100 acre Ohio River site is Olin Mathieson's $55 million rolling mill, with a yearly production capacity of 120,000 tons of sheet and coil.

- **Dresden Nuclear Power Station**—Site work for the nuclear power plant of Commonwealth Edison Co. (Chicago) began in November, 1956, with major construction getting under way last June. Now about 25% complete, the project will be ready for reactor fueling in October 1959, and for operation in July 1960. Net capacity: 180,000 kw.

- **Power Reactor Development Co.**—The 100,000 kw nuclear power plant at Monroe, Mich., is about 10% complete. It is scheduled to begin a year of test operation in September, 1960.

- **Campbell Soup Co.**—Started in 1955, this Napoleon, Ohio, plant was put into production last year. It totals about 20 acres in floor area, including air-conditioned offices, laboratory and cafeteria; a complete food processing operation; cold-storage warehouse; can-making facilities; warehouses; tomato-processing plant; and boiler house. Cost was about $16½ million.

- **Tallest concrete building**—This country's tallest reinforced concrete building, a 40 story, 365 ft high apartment hotel called Executive House, on Chicago's E. Wacker Drive, is now 30% complete. Construction of the $6 million structure is above the 20th floor. Initial occupancy is scheduled for November, with all construction to be finished by the end of the year. The 448 unit hotel

MID-WINTER CONSTRUCTION
AND LEHIGH EARLY STRENGTH CEMENT

Pouring floor for new Alfred Agricultural and Technical Institute Dormitory.

- Year after year, construction work becomes less seasonal, even where winters are long and severe. Modern construction methods and such modern materials as Lehigh Early Strength Cement are largely responsible for this trend.

This new dormitory, constructed in Alfred, N. Y. for the New York State Dormitory Authority, illustrates the point. Its reinforced concrete foundations, floors and arches were poured during the winter season.

With Lehigh Early Strength Cement, the concrete reached service strength in less than half the usual time—and winter construction costs were cut all along the line. (On forms and labor alone, for example, the contractor estimated savings of $2000 and $1500 respectively.)

Remember Lehigh Early Strength Cement when planning winter concrete work. On large jobs and small, chances are it will save *you* time and money.

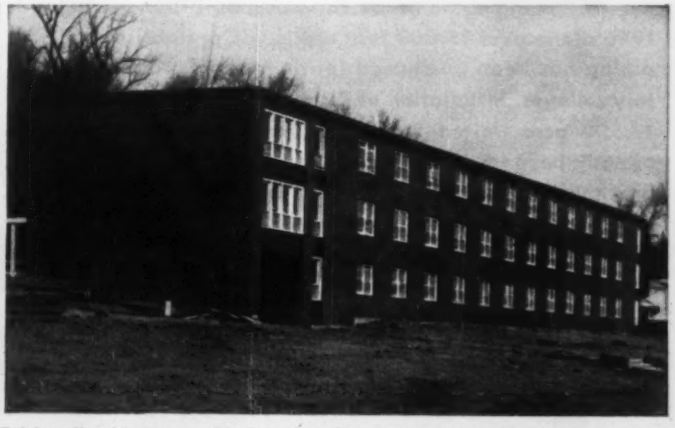
State Architect: Carl Larson, Albany, N. Y.
Plans Architect: Urban, Brayton & Burrows, New York City, N. Y.
Contractor: John W. Rouse Construction Corp., Gouverneur, N. Y.
Ready Mix concrete supplied by: L. C. Whitford Co., Alfred, N. Y.

LEHIGH PORTLAND CEMENT CO.

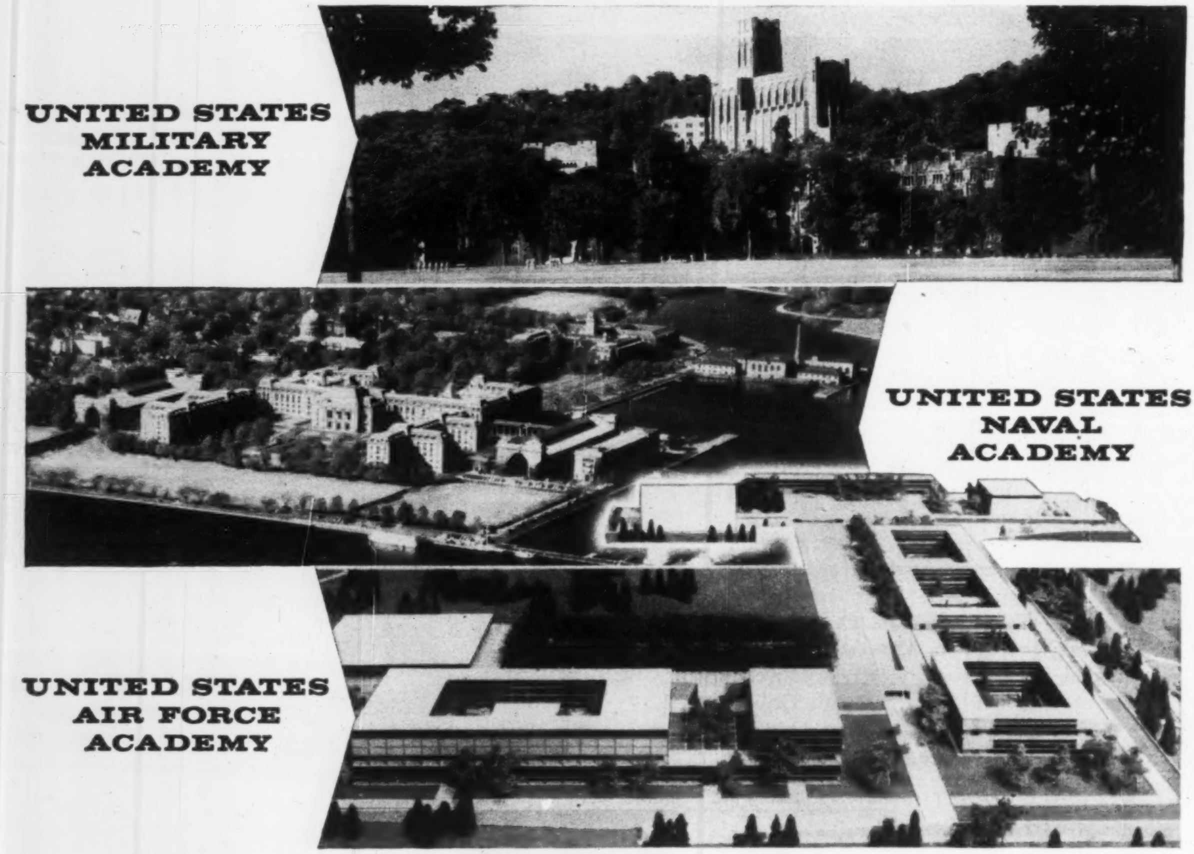
Allentown, Pa.

- **LEHIGH EARLY STRENGTH CEMENT**
- **LEHIGH MORTAR CEMENT**
- **LEHIGH AIR-ENTRAINING CEMENT**
- **LEHIGH PORTLAND CEMENT**

Lehigh Early Strength Cement helped contractor save on form, winter curing and overhead costs.



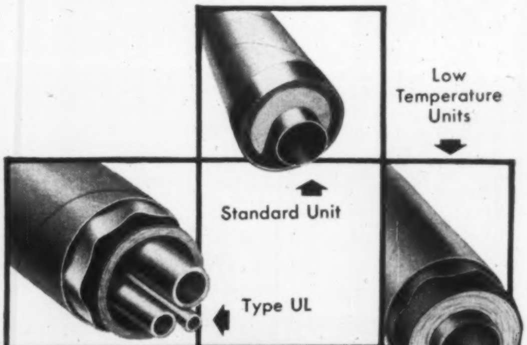
Brick walls with concrete block backup for this 300 student dormitory were laid up with Lehigh Mortar Cement.


UNITED STATES
MILITARY
ACADEMY
UNITED STATES
NAVAL
ACADEMY
UNITED STATES
AIR FORCE
ACADEMY

Photographs courtesy United States Military Academy, United States Naval Academy, and United States Air Force Academy.

RIC-WIL underground piping systems serve ALL three...West Point, Annapolis and NOW...the new Air Force Academy

West Point and Annapolis have been serviced by Ric-wiL piping systems as far back as 1931. Since 1946 alone over 15,000 feet of Ric-wiL prefabricated piping has been purchased for the nation's top military colleges. Installation of Ric-wiL piping at the new 17,500 acre United States Air Force Academy has already been installed. Ric-wiL is indeed proud of the part they have played in serving these military academies for a period of over twenty-five years.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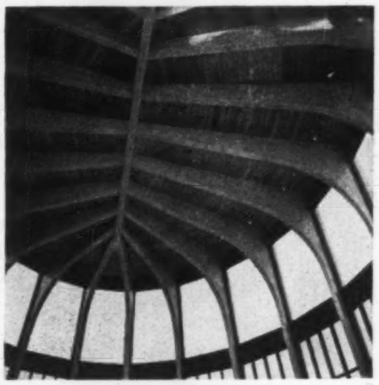


GLUED-LAMINATED RIBS frame an elliptical section of a New Jersey synagogue.

will feature a heliport at the 40th floor level.

• **Underground garage**—Parking facilities for 1,050 cars were completed during 1957 beneath Detroit's Grand Circus Park, and the above-ground area was restored to public use. Privately financed at a cost of $3.6 million, the garage will go to city ownership after 40 years.

• **Inland Steel headquarters**—Inland Steel Co.'s new 19 story office building and adjoining 25 story service tower in the heart of Chicago's Loop was 92% complete at the end of 1957, with initial occupancy planned for early this year. Exterior columns support 58 ft girders to provide unobstructed space on the 177x58 ft floors. Walls are about 30% stainless steel and 70% glass.

• **Chicago Sun-Times**—A nine-story building with a total floor area of 460,000 sq ft will be completed early this year for the Chicago Sun-Times. Located on the east bank of the Chicago River, the steel-frame structure is supported on 12 ft dia caissons sunk 120 ft to bedrock. Windows are joined by aluminum spandrels, and the exterior walls have vertical mullions of stainless steel. Air conditioning and ventilating fans are located on the 8th and 9th floors. There are four automatic passenger elevators and one freight elevator, with escalators also serving the first four floors.

• **Caterpillar plants**—Ground was broken last August and steel erection was started in December on Caterpillar Tractor Company's 542,000 sq ft industrial engine manufacturing plant near Peoria, Ill. Completion is scheduled for early next year. An 850,000 sq ft parts department was completed at Morton, Ill. By mid-1958 production

ILLUSTRATED: The Springtide Apartments in Ft. Lauderdale, Florida, U.S.A. built by the Holland Construction and Engineering Company. The BUCK HOISTOWER was chosen to do the work because of its mobility—dependability—strength and low operating cost.

BUCK hoisTower

The **BUCK HOISTOWER**—is the answer for today's competitive bidding. Contractors report average savings of $200 to $400 for tower erection cost alone, figured on time involved and the number of men required. The **BUCK** is a completely portable Hoistower, with a controlled hoisting speed up to 170 ft. per minute. It has been used successfully for hoisting material 12 full floors. See Photo.

The **HOISTOWER** can be towed to the jobsite, placed and erected by one man in just 23 minutes. Extra 5 ft. and 10 ft. sections for additional height.

The **POOP DECK**—a sturdy platform extension — that can be added to the concrete bucket undercarriage. This deck makes it possible to hoist loads of masonry and other material between loads of concrete, without changing to the regular platform.

The **CHICAGO BOOM** — for special hoisting jobs, such as re-inforcing steel, pipe, heating ducts et cetera. The boom can be used with the bucket and poop deck or platform in place.

For further information—write

B BUCK EQUIPMENT CORP.
720 E ANDERSON FERRY RD., CINCINNATI 38, OHIO

Steeltex easily spans six-foot centers on the fifth and sixth floor addition to Henry Ford Hospital in Detroit where it is supported by temporary shoring during pouring and curing. Bar mats provide reinforcing while Steeltex floor lath gives form to 3½ inch slab. Previously Steeltex was used on only 2- to 3-foot centers. The architect's decision to use Steeltex instead of wooden forms for six-foot spans was something new, but he soon saw it pay off as . . .

New use for Steeltex saves $26,000 at Henry Ford Hospital in Detroit

On Henry Ford Hospital's fifth and sixth floor addition, a new use for Steeltex floor lath piled up savings of approximately $26,000 on cost of materials and almost 50 percent on labor.

Architects for the $3½-million job approved Steeltex and bar mats to support 200,000 square feet of 3½ inch concrete slab set on six-foot centers by an ingenious method.

Previously, Steeltex wire mesh reinforcing—sold by Pittsburgh Steel Products Division of Pittsburgh Steel Company—had been used on centers two to three feet apart.

On jobs where the centers were farther apart, the architect usually specified a wooden forming material. Bar mats provided the reinforcing.

But Mike Sonk, Pittsburgh Steel Products Detroit district sales manager, had another idea.

He thought Steeltex could not only provide waterproofed forms less expensively for the Detroit hospital but help the bar mats make a stronger slab.

Sonk approached the architects with his idea. He pointed out Steeltex' cost saving advantages, speed of installation and ease of handling.

Whitacre Engineering of Canton, Ohio, contractors for the Steeltex-bar mat installation, also found out quickly how well Steeltex fills their needs.

The use of Steeltex brought a savings of approximately 50 percent.

Instead of spending many hours installing wooden forming material, laying bar mats and installing shoring, here's all Whitacre Engineering workmen installing the floors had to do:

Unroll lightweight Steeltex, cut it, tighten it, clip it and lay the bar mats —all in much less time.

The Steeltex-bar mat combination

Steeltex gives clean, neat appearance underneath slab after shoring is removed. Pittsburgh Steel Products Salesman Russ Nutter shows A. M. Downes, field engineer for sub-contractor, Whitacre Engineering, how easily ceiling hangers were placed through Steeltex paper, thereby eliminating costly drilling of individual holes when wooden forms are used. Architect: Albert Kahn Associated Architects and Engineers of Detroit.

also requires temporary shoring. But there's one big difference. Once shoring is removed, Steeltex is not dismantled as wooden forms are. Result? Better safety, better housekeeping, greater time savings.

Steeltex' speed of installation and easy handling really impressed Whitacre Foreman Mike Malett. He said:

"This is the first time I've seen Steeltex used primarily for its forming ability. I'm pleased with it.

"It certainly reduced forming costs. It took three men only one day to install 3,500 square feet of Steeltex on one of the floor sections.

"With wooden forms, it would have taken ten men two days."

"I also like the way Steeltex permits quick, easy installation of ceiling hangers," Mr. Malett added.

"All you do is stick the hangers through Steeltex paper so they protrude below where the ceiling is hung.

"With wooden forms we would have had to drill hundreds of holes for the hangers. That takes a lot of time and makes labor costs much higher."

A. M. Downes, field engineer for Whitacre Engineering, added: "I like the way Steeltex fits snugly around columns and pipes. It also cuts down drip-through of cement. Both advantages are a great help.

"What's more, our workmen can walk safely on Steeltex during installation and while concrete is being poured.

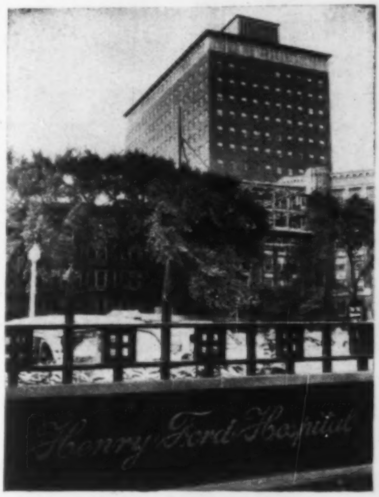
"Steeltex is ideal," Mr. Downes declared. "It gives reinforcing throughout, acts as a form and aids in curing the slab."

Steeltex' advantages can be put to work for you, too, on an application like that at Henry Ford Hospital. Or you might have one where centers are closer.

But no matter what the application, Steeltex is available to cut labor and material costs and insure stronger, more durable slabs.

Complete engineering advice is available at any of the Pittsburgh Steel Products Sales Offices listed here.

Call today . . . pocket the savings tomorrow.



▶ See Sweets Catalog Section 2-B

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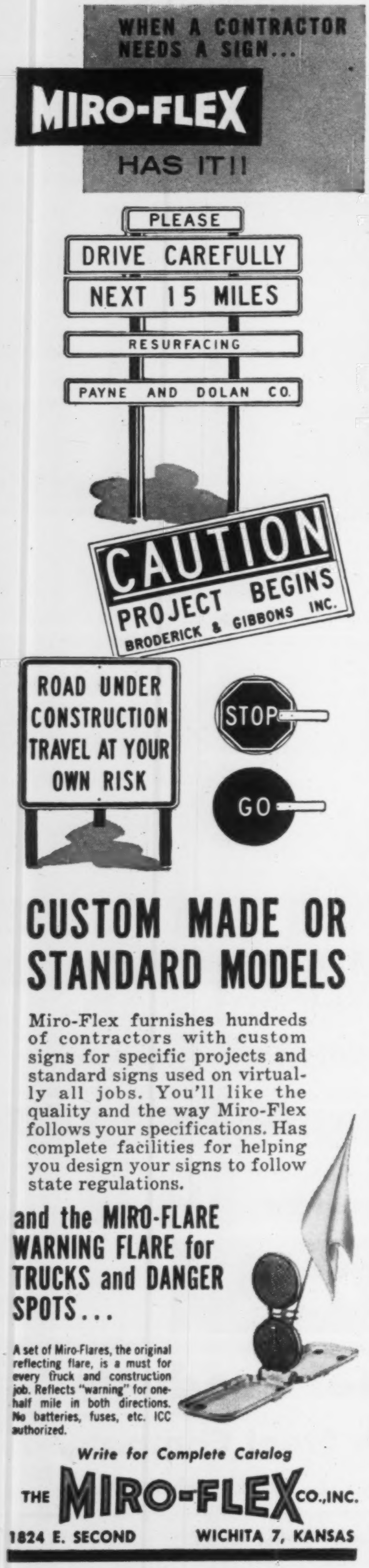

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A set of Miro-Flares, the original reflecting flare, is a must for every truck and construction job. Reflects "warning" for one-half mile in both directions. No batteries, fuses, etc. ICC authorized.

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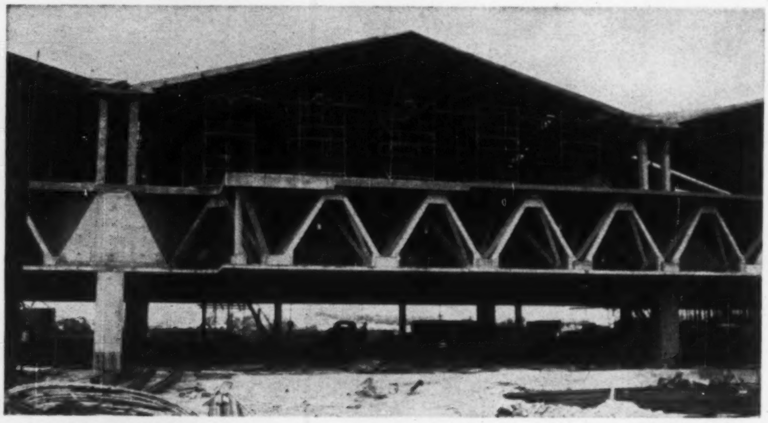

DOUBLE DISTINCTION in reinforced concrete construction of Texas plant lies in hyperbolic paraboloidal roof and space-frame floor structure.

of D4 tractors and two models of tracked front-end loaders is scheduled to start at the company's new 1.3 million sq. ft. plant at Aurora, Ill.

• **Borg-Warner**—The 21 story, $9 million Borg-Warner office building on Michigan Ave. in Chicago is 85% complete. Initial occupancy is scheduled for April of this year, with final completion during the summer. It features deep blue curtain wall construction with aluminum mullions and window frames. Air conditioning, heating, and other mechanical equipment is located at penthouse level, while the basement is devoted entirely to garage space.

• **PCA Laboratories**—Two new laboratory buildings at the Portland Cement Association's Research and Development Laboratories in Skokie, Ill. will be completed ready for occupancy by April 15 of this year. Total cost of the two buildings, including equipment, landscaping and paving, is $2.75 million. The two new buildings are a 56x176 ft Structural Development Laboratory, and a Fire Research Center measuring 56x220 ft with a two-story 24x132 ft wing on one side. The main portion of each building is a single room 40 ft high, constructed of identical precast concrete structural members. Building frames are conventional reinforced concrete using high-strength steel. Wall panels are tilt-up construction, and roofs are precast concrete units.

• **Morton Salt Co.**—Initial occupancy of the $6 million office building of the Morton Salt Co., under construction on North Wacker Drive in Chicago, is scheduled for April of this year. Exteriors are of limestone, granite, stainless steel and glass. The 5 story structure features automatic elevators, complete automatic air conditioning, thermostatically controlled baseboard heating, recessed fluorescent lighting, acoustical ceilings and resilient floor tile.

• **Cleveland Press**—October will see completion of the new $10 million, 300,000 sq ft publishing plant of the Cleveland Press. Part of the building is framed with 35 ft high, three-story precast concrete columns and 30 ft prestressed concrete girders and beams.

• **Yoder Co.**—An $8 million, 346,000 sq ft plant and office building to be built over a 10 yr period by this metal-working-machinery manufacturer in Westlake, Ohio, involves 35,000 sq ft of stainless steel curtain walls in the first phase of construction, completed last month. Steel-faced inside and out, the walls are 3 in. thick, including 1½ in. of insulation.

• **Cleveland Electric**—Stainless-steel-faced curtain walls 3 in. thick will enclose a 50,000 sq ft addition being built at the Avon Lake, Ohio, power plant of the Cleveland Electric Illuminating Co.

• **Locomotive plant**—General Motors Corp.'s Electro-motive Division added 750,000 sq ft last year at the La Grange, Ill., plant, bringing total space there to about 3 million sq ft. The $17 million addition, consisting of two one-story buildings, is about 95% complete.

West of Mississippi

• **Air Force Academy**—Construction of the $150 million U.S. Air Force Academy 10 miles north of Colorado Springs, Colo., was 50% complete at the end of 1957. Target date for completion of the facilities ready for the first class of cadets is September of this year. Twenty major contracts were

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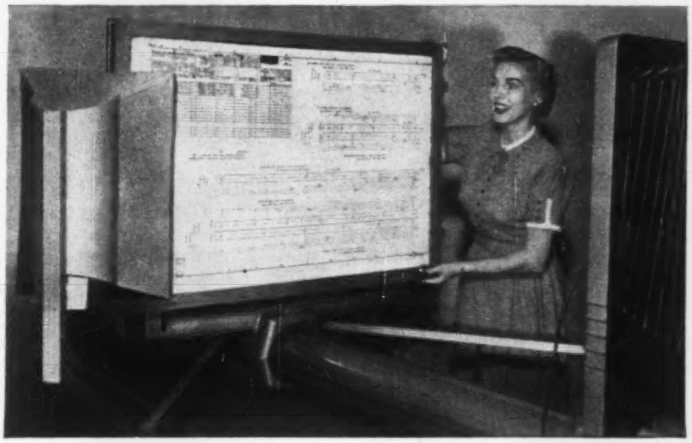

24" x 36" drawing on copyboard of camera. Drawing is exposed to XeroX plate and reduced to 12" x 18" size by xerography.

Copies engineering drawings or anything written, typed, printed or drawn up to 24"x36", by xerography onto offset paper masters for runoff of 12" x 18" multiple copies on offset duplicator . . .

Using xerography and offset duplicating, one hundred copies of an engineering drawing, reduced from 24" x 36" to 12" x 18" can be produced in about five minutes. Copies are sharp with details of the original clearly readable on the reduced size.

Xerography is a dry, electrostatic, copying process requiring no intermediate negative. No sensitized papers, water or liquid chemicals are used.

COMPARE VOLUME—*Rear:* 350 Blueprints each of D-C-B and A sizes. *Front:* same quantity reproduced by xerography & offset duplicating.

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Dimensional Stability—Improved stability over older methods, since all process steps are dry.

Ease of Reading—High contrast, permanent, black-ink image on white paper.

Ease of Writing—Clear, white background on print suitable for notes, calculations, instructions, etc.

Lower Postal Charges—Decreased size and weight results in lower postal charges for transmittal to vendors and customers.

Greater Versatility—Vellum copy included in run-off may be used as an intermediate for re-runs and for reproduction by diazo at different locations.

Write for details showing how XeroX Model 1218 copying equipment speeds operations and cuts costs in road building projects.

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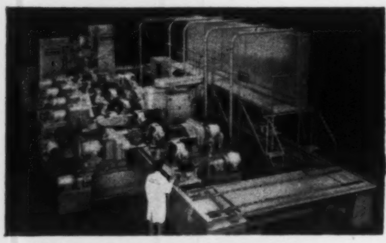
Complicated Concrete Forms Eliminated by WELD-CRETE®

-the amazing liquid bonding agent!

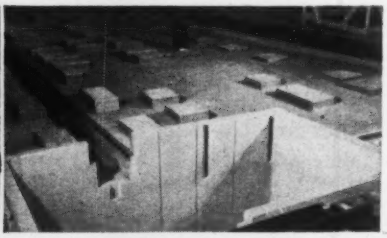
Produces substantial savings for Eaton Manufacturing Company

The Problem: To install two 75-ton 25′ x 67′ milling and drilling machines on concrete floor of Cleveland plant. Machine had to rest on piers rather than floor itself, and forms required for single pour of these mounts were extremely expensive.

Weld-Crete the Answer: Weld-Crete was brushed on 36″ thick base floor at spots where 80 piers were to be located. With the simplest of forms, these 8″ thick piers were later poured with assurance of a permanent bond to the base. The $650,000 machines have operated on these mounts for over a year.



75-ton machine mounted upon 80 concrete piers permanently bonded by Weld-Crete to concrete floor base.



Shows some of 80 piers bonded to concrete base by Weld-Crete. Simple bonding replaced complicated forming, resulted in appreciable savings in installation of 75-ton machines shown above.

Whether you're installing new equipment, moving old, or repairing floors . . . Weld-Crete enables you to *permanently* bond new concrete *directly* to old . . . or *any* sound surface. No costly, time-taking chipping, drilling, roughening, acid washing or scarifying of concrete base. When used with quick setting cement topping, you can lay new floors, ramps, driveways, etc., and run heavy truck traffic over them the next day. The insurance of a permanent bond with Weld-Crete costs as little as 4c per square foot! Get fact-packed literature about Weld-Crete from your Weld-Crete dealer, see Sweet's File, or write us direct.

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Box 57561 Bethesda, Md.

For Bonding Plaster to any surface . . . ask for Plaster-Weld®

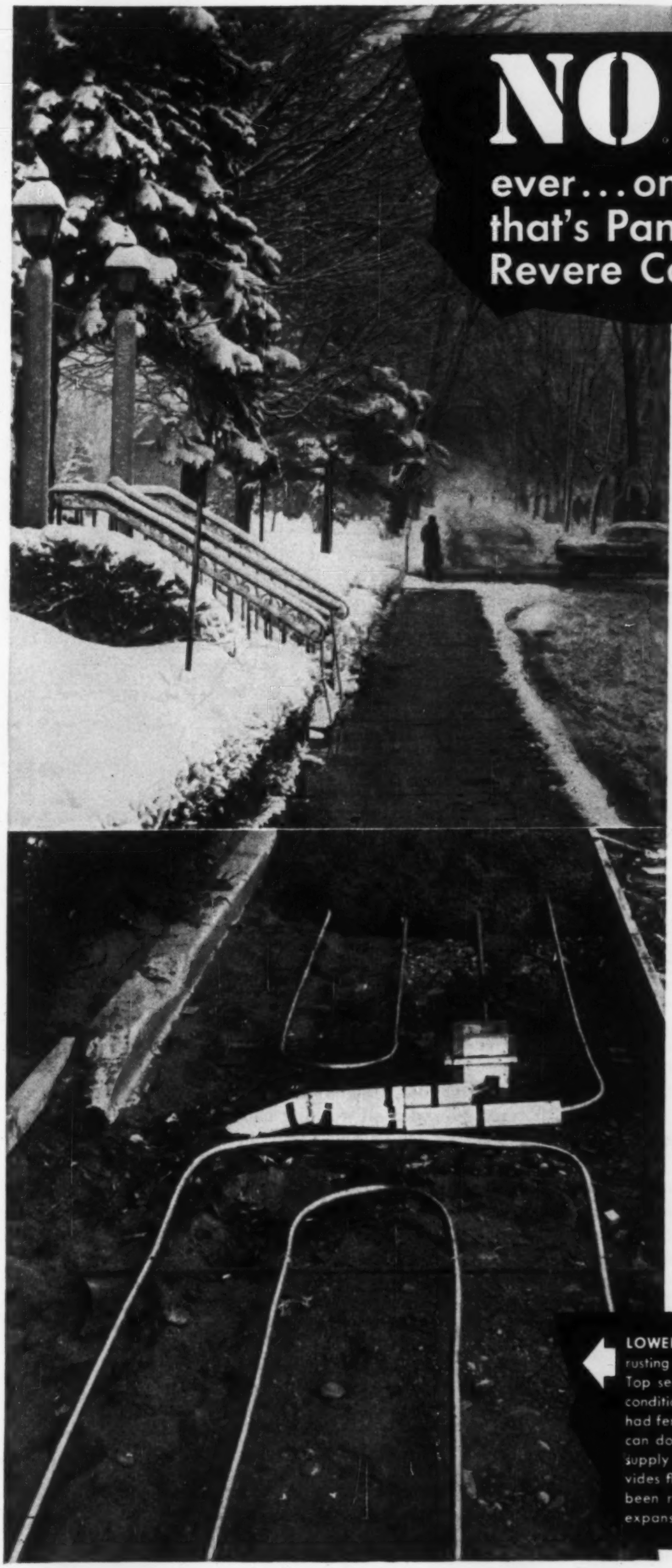
CHICAGO SUN-TIMES BLDG. rests on 12 ft dia caissons sunk 120 ft to bedrock.

completed last year and nine others were advanced to more than 85% completion. A total of $60 million in construction was completed during 1957 and $58 million worth of work is now under contract. At year's end the cadet quarters building was 65% finished; the academic building, 45%; the cadet dining hall, 40%; the administration building, 20%; and the physical education complex, 15% complete. Contracts to be awarded in 1958 include paving and lighting of the academic area; landscaping the community center area; a 135 bed hospital; a tri-faith chapel; and the first group of a total of 1,200 two-, three-, and four-bedroom housing units for officers and airmen of the academy and their families. Forty-four houses for department heads on the faculty are now under construction

• **Denver Bank**—Exterior work on the 28 story, 365 ft high First National Bank Building, Denver's tallest building, was completed last month. The remainder of the building will be finished and occupied this year. A four-level parking garage is part of the $15 million project.

• **Petroleum Club Building**—All office space in this 17 story Denver structure is now occupied by oil firms, which started moving in last summer. The top two floors, commanding a panoramic view of a 150 mile stretch of the Rocky Mountains, are occupied by the Petroleum Club of Denver. Three street sides are finished with aluminum and glass and the alley side with brick.

• **Court House Square**—Construction of the $35 million Court House Square development in Denver, Colo. is 50% finished. Completion of the big commercial building project is scheduled for March, 1959. The 6 story steel-frame department store, now 90% complete, will be opened for business next May. A four-level underground garage is complete except for ramps, and the 750 room 20-story hotel is



NO SNOW

ever... on the sidewalk that's Panel Heated with Revere Copper Water Tube

Huge strides are being made by this method of snow removal. No wonder, shoveling and accidents due to snowy walks are eliminated . . . while the time and labor saved pays for the installation in short order.

That's why you'll find snow melting panels also being used on driveways, loading platforms, entrance aprons, service stations, pedestrian ramps at railroad stations, airports and similar spots. One application which bears special mention is the use of coils in garages. They quickly melt the snow on cars, keep floors dry as well as keep the repair shop floors warm so mechanics can lie right on the bare concrete in comfort.

And when you make the panels of Revere Copper Water Tube you have these added advantages: Copper can be bent to conform to the terrain. Bendability permits use of sinuous coils, while the 60-foot lengths of tube mean fewer fittings which, when joined by solder means joints that stay tight. Copper tube cannot rust, rot or deteriorate. That's why, on the inside, full flow and low frictional resistance are maintained throughout its long life. While external moisture will not harm it from the outside.

Keep ahead of the parade. Recommend Panel Heating for snow removal. Revere's Technical Advisory Service will be glad to help you in the proper application of Revere Copper Tube in working up your plans.

FREE! Instructive 16mm Full Color Motion Picture, "The ABC of Radiant Panel Heating." Write Advertising Department for details.

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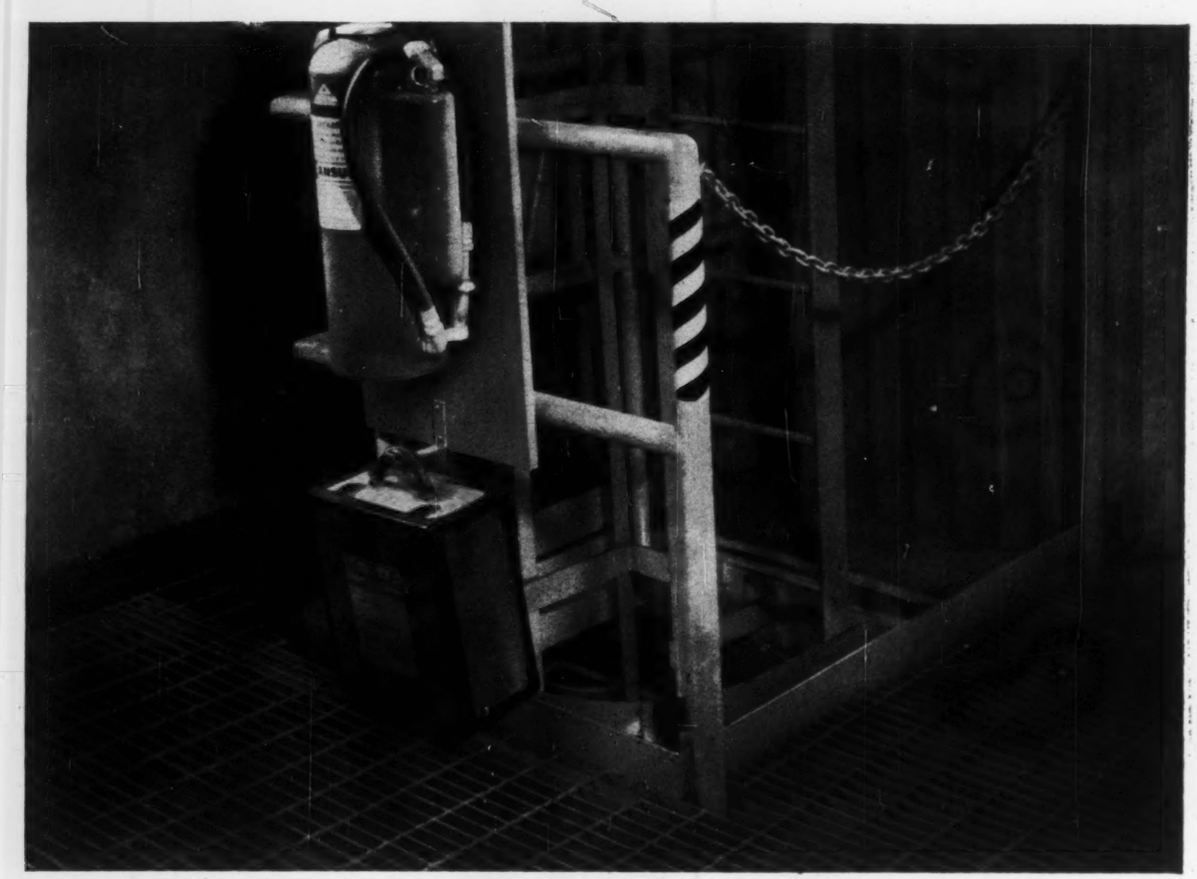
LOWER SECTION OF PHOTOGRAPH shows how non-rusting Revere Copper Tube was imbedded in concrete slab. Top section of photo shows same walk under actual snow conditions. Note bends. Think of all the joints necessary had ferrous pipe been used. And think, too, of what seepage can do to rustable materials. Note insulation used on each supply and return line to the coils from the mains. This provides flexibility in the take-offs from the mains, which have been run below the slab, to allow for movement due to expansion and contraction.



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Each section of Blaw-Knox Steel Grating is of rigid, one-piece construction. Choice of cross bar and bearing bar designs and spacings affords maximum safety under all working conditions. Indoors or out, you get safe, quiet, long lasting and self-cleaning flooring with maximum passage of light and air.

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JETLINER PLANT has more than a million sq ft of floor space in two buildings.

about 10% complete. It is expected to be finished by March, 1959.

- **Texas Instrument Co.**—This $4 million Dallas factory, to be completed by April, is distinguished by two standout features: The roof is made up of reinforced concrete hyperbolic paraboloidal shells, supported on a 63 x 63 ft column grid; and the second floor is framed with a 9 ft thick arrangement of precast concrete space frames.

- **Montana State College**—Completed last spring, the $1.5 million field house of Montana State College, Bozeman, Mont., set a span record for timber-framed domes. Glued-laminated wood ribs arch across the 300 ft diameter of the structure with no interior supports.

- **Sheldon Station**—The Consumers Public Power District nuclear power plant, to be built near Hallam, Nebr., is still being designed, with construction expected to start next year. Net capacity will be 75,000 kw.

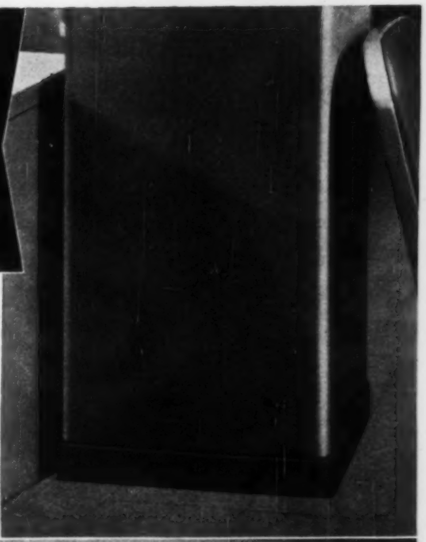
- **Texas Co. refinery**—Construction is ahead of schedule on a 40,000 barrel-per-day refinery for the Texas Co. at Anacortes, Wash., scheduled to go on stream next January. A deep-water pier, 5,600 ft long with an additional 1,200 ft L-head at the end, will be one of the few in the U.S. capable of handling the world's largest tankers, fully loaded. The refinery will have a chemical waste treatment plant, designed to protect oyster beds and fisheries in the area, where effluent can be held until tidal conditions are satisfactory for discharge into Puget Sound.

- **Chrysler assembly plant**—The Chrysler Corp. expects to start work on a $15 million assembly plant at St. Louis if zoning difficulties can be worked out. Plans are being prepared for the project, which will consist mainly of a steel-framed assembly building and a reinforced concrete administration building.

- **Dallas Memorial Auditorium**—This 300 ft dia circular auditorium, com-

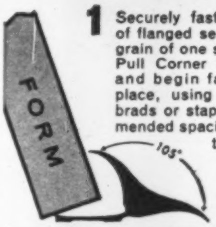
FOR Rounded Concrete Corners

SERVICISED re-usable "GREEN STREAK" Corner Former

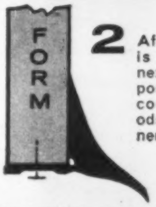


SIMPLE INSTALLATION

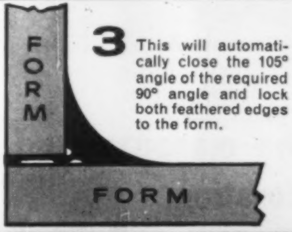
1 Securely fasten top end of flanged section to end grain of one side of form. Pull Corner Former taut and begin fastening in place, using strip nails, brads or staples. Recommended spacing not more than 4" apart.



2 After Corner Former is fastened, place next side of form in position and tie by conventional methods to form the corner joint.



3 This will automatically close the 105° angle of the required 90° angle and lock both feathered edges to the form.



Servicised "Green Streak" Corner Former provides a quick, easy and low cost method of forming perfect 1" radius rounded corners on piers, beams and all outside corners of poured concrete. Made of a tough, durable and resilient plastic, the Corner Former is simply fastened to the form (see installation drawings at left) and it automatically assumes the correct radius. Because it is readily removed and re-installed, Servicised "Green Streak" Corner Former is by far the lowest cost method of round corner forming you can use.

Available in standard lengths of 10 ft. Four 10 ft. pieces packaged in a tube. Write for full details and prices.

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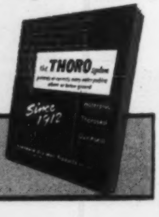


STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PENNA. CENTERVILLE, IND.

pleted last September, can seat 11,000 people. The wedge-shaped elements that make up the reinforced concrete roof were cast in mutually opposing pairs on traveling formwork, moved along a circular path.

• **Southland Center**—Steel work on Southland Life Insurance Co.'s $35 million office building-hotel project in Dallas was completed in December. The structure will consist eventually of a base block topped with three towers. Now under construction and scheduled for completion next January are a 42 story tower for the insurance firm's home offices, and a 28 story section, which will be the Sheraton-Dallas Hotel. A 32 story office tower will be added later.

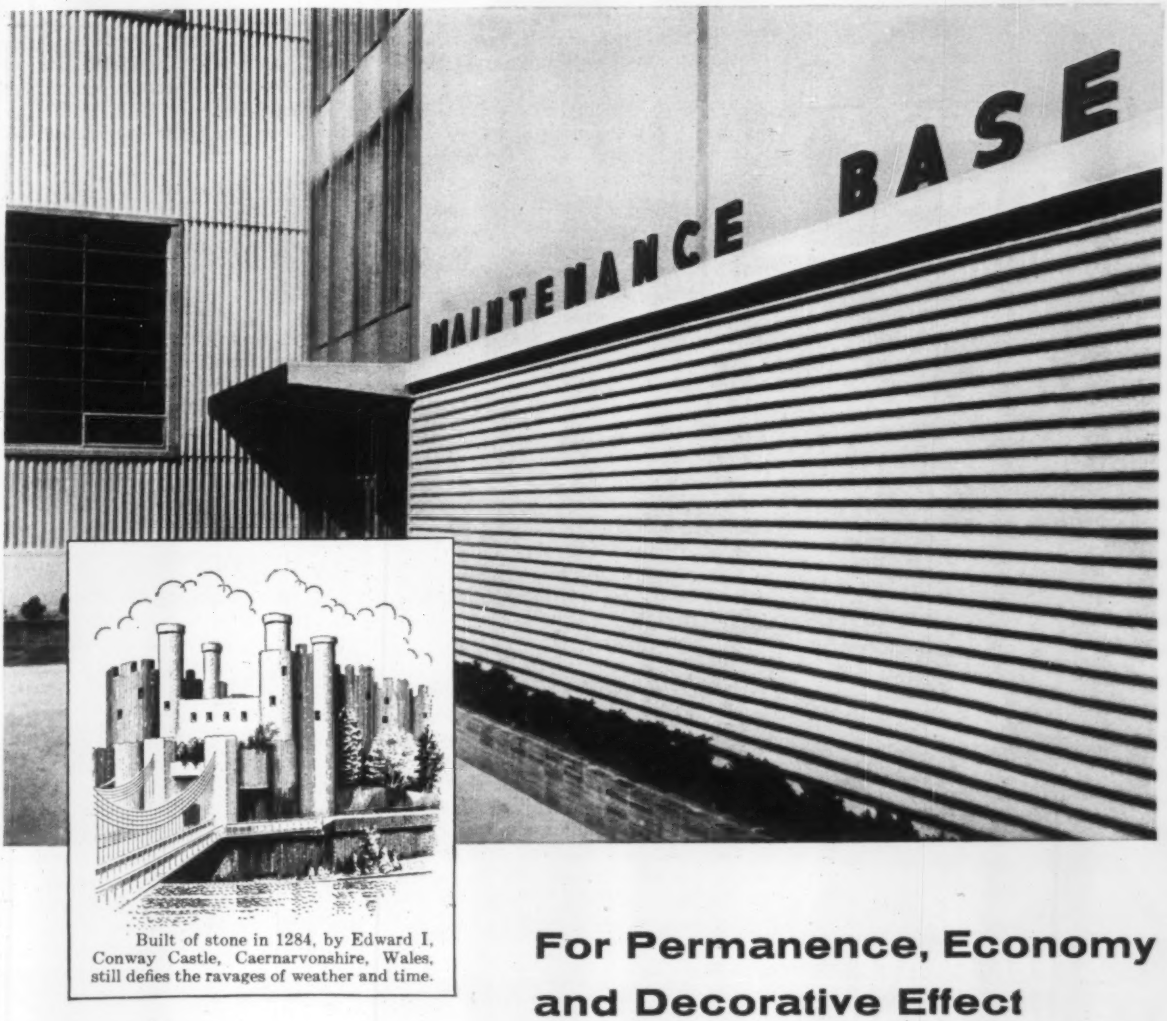
Far West

• **Ford missile center**—Construction has begun on the first unit of a multimillion dollar research, development and prototype center for Aeronutronic Systems, Inc., on a 200 acre site at Newport Beach, Calif. Aeronutronics, West Coast subsidiary of the Ford Motor Co., was the developer of Project Far Side, high altitude rocket, for the Air Force.

Structures now under construction at the Newport Beach site are aerothermochemical and materials laboratories to be used in experimental work on the re-entry aspects of Air Force ICBMs. They are scheduled for completion in April, 1958. Next units to get under way will be a missile and astronautical sciences laboratory and an electronics engineering building. These will be followed by construction of administrative offices, prototype manufacturing facilities and experimental installations.

• **Osteopathic hospital**—Construction of what is reportedly the largest osteopathic hospital in the nation—the 9 story, $8½ million Los Angeles County Osteopathic Hospital—reached 63% completion by the end of 1957. When completed in the spring of 1959, it will contain room for 500 beds and quarters for 77 interns.

• **Boeing Airplane Co.**—Construction was completed during the year on three large Boeing projects in the state of Washington—a $22 million developmental center at Seattle, a $13 million factory and office building at nearby Renton and a $7¾ million, eight-plane hangar, believed to be the biggest in the U. S., across the mountains at Moses Lake. The developmental center is one of the largest prestressed concrete buildings in the world, with two principal structures and several auxiliary buildings



Built of stone in 1284, by Edward I, Conway Castle, Caernarvonshire, Wales, still defies the ravages of weather and time.

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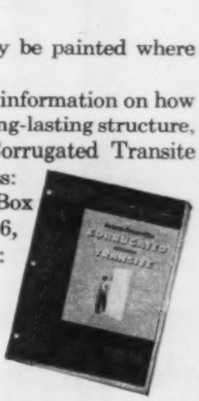
You save money on maintenance with this asbestos building sheet. It can't rot, can't rust, can't burn. It has high resistance to acids, to gaseous fumes, to severe temperatures, to vermin and insects.

Simple and pleasing shadow-line effects in decorative design are achieved by installing Corrugated Transite vertically or horizontally. Sheets are of a light gray color. Design possibilities can be expanded by combining Corrugated Transite with other types of building materials. Transite may be painted where desired.

For additional information on how you can have a long-lasting structure, write for new Corrugated Transite brochure. Address: Johns-Manville, Box 158, New York 16, N. Y. In Canada: 565 Lakeshore Road East, Port Credit, Ontario.



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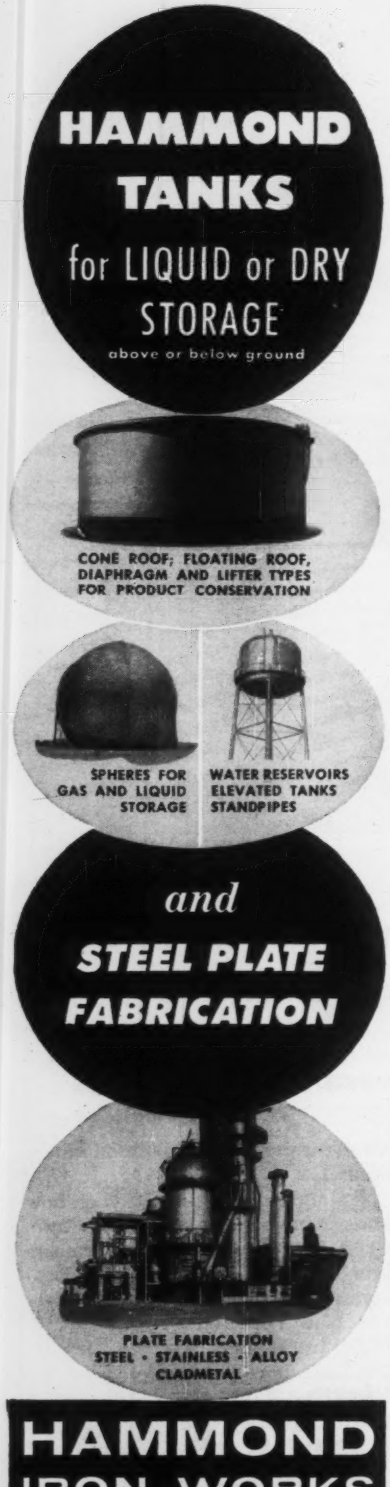
JOHNS-MANVILLE JM PRODUCTS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providing almost one million sq ft of floor area.

• **Crown Zellerbach Building**—Crown Zellerbach's $15 million, 20 story headquarters office building in San Francisco was started last year. Sheet piling was driven 55 ft into the ground, and the building's foundation—a concrete mat 8 ft thick, 30 ft below street level—was poured. Late in the year structural steel began to arrive. Columns and beams for the 150 car garage beneath the building have started to go up. Completion is scheduled for early 1959.

• **Kaiser Center**—Excavation and foundation work for the headquarters at Oakland, Calif. of all Kaiser industries is well along, and superstructure construction will start this year. The 28 story glass, steel, and aluminum structure is expected to cost $40 million. It will be floated on a 416 x 62 ft concrete slab 5 ft thick. Completion is scheduled for the summer of 1959.

• **Union Oil Center**—Union Oil Co.'s four-building, $20 million home office center in Los Angeles is 90% complete. All exterior veneer and aluminum work has been done on the unique diamond-shaped, 13 story main tower. Also included in the complex are two office buildings, four and three stories high, and a two story auditorium, connected to the main building by two post-tensioned pedestrian bridges.

• **Aerojet-General Corp.**—Construction during 1957 at the Sacramento, Calif., plants included a $12 million liquid rocket facility and metal parts manufacturing building, supporting units for making the air force Titan intercontinental ballistic missile. Other projects placed under construction include facilities for manufacturing the navy's Polaris intermediate range ballistic missile. In the next year or so another $20 million will have been spent on facilities at the Sacramento plants, engaged in making of both liquid and solid propellant missile engines.

• **Los Angeles sports arena**—Construction of the $6 million Los Angeles Memorial Sports Arena will begin soon, with completion set for the fall of 1959. With 360 ft clear span, it will be adaptable for ice hockey, basketball, boxing, conventions or trade shows. Maximum capacity will be 30,000.

• **California state buildings**—The State Division of Architecture's construction program in 1957 exceeded $82 million, and the agency expects to begin construction on over $170 million of state building projects during 1958. Included in the new work is almost $30 million for college residence halls, authorized for construction by the legislature last year.

• **U. S. Borax**—U. S. Borax & Chemical Corp. enlarged its production of boron trioxide by about 30% through completion of a new $20 million open pit mine and refinery at Boron, Calif., 130 miles northeast of Los Angeles. Some 9 million tons of earth had to be removed and almost 30,000 cu yd of concrete placed. Among the refinery installations are four covered, insulated, steel thickener tanks, each with a capacity of 3 million gal.

• **Jet air liner plant**—Douglas Aircraft Co. completed its $20 million DC-8 jetliner manufacturing plant in Long Beach during 1957. The project included construction of two hangar-type buildings with a combined floor space of about 1 million square feet and three shop services buildings.

• **Freeway Center Bldg.**—Soil tests were completed late in the year, preparatory to clearing a site for construction of the 40 story Freeway Center building in downtown Los Angeles. The $23.8 million skyscraper will contain 720,000 sq ft of office space for lease to the transportation and finance industries. A series of paraboloid thin-shell concrete structures adjacent to the main tower will provide space for retail shops and will serve as the main entries to the office building.

• **Kaiser Steel**—Biggest of the Southern California construction programs, the $194 million expansion of the Kaiser Steel Corp. plant in Fontana, is 75% complete. Among the major facilities included in the expansion program are 90 new coke ovens, a second sinter plant, a new blast furnace, three oxygen steel-making furnaces, 10 new soaking pits, a universal slabbing mill, and an electrolytic plate line. All these projects plus a hot-strip mill will be completed this spring, and conversion of an existing 110 in. plate mill to 148 in. will be completed some time later.

• **Shopping center**—Expected to get under way this year is a $40 million shopping center in Torrance, Calif. Dominant structures will be two department stores, each with about 250,000 sq ft of space.

• **Apartments**—Construction of the swank Wilshire Terrace penthouse apartment building in Los Angeles began in July and was 25% complete by

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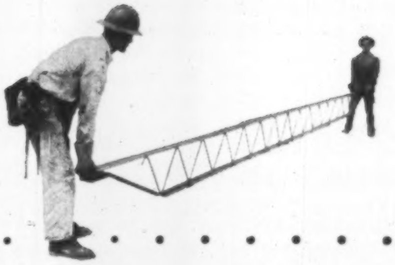

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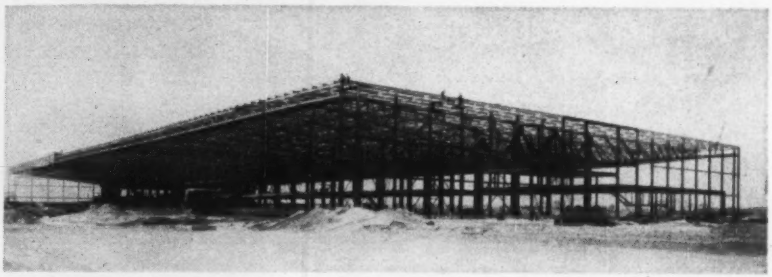


DOUBLE CANTILEVERS in steel extend 140 ft on either side of a steel-framed central structure in American Airlines' new hangar under construction at Idlewild Airport.

the end of the year. Estimated completion date is June. The $7½ million, 14 story structure will contain 113 units for sale at asking prices starting at $115,000. Each floor is being completed for occupancy before proceeding with construction on the next.

• **Los Angeles Civic Center**—A large-scale face lifting of the Los Angeles Civic Center made headway during 1957. Foundations for the $25 million County Hall of Administration were completed and steel deliveries are expected this month. General contract bids have not yet been taken. The 1 million sq ft county office building is scheduled for completion in January, 1960. The 684,000 sq ft, $20 million county courthouse reached 65% completion by the end of the year, with most exterior work finished and occupancy scheduled for next September. A $4 million central heating plant is nearing completion. Scheduled to be bid this spring are the Hall of Records and a state office building, each to cost an estimated $11 million.

• **Los Angeles schools**—The school board spent money at the rate of $1 million a week for new construction and school improvements during 1957 and ended the year with about $20 million left from the 1955 bond issue of $133 million. Largest individual projects during the year were two $5 million senior high schools, now complete except for auditoriums and landscaping.

• **Southern California Edison**—Two $60 million projects designed to increase Southern California Edison's electrical generating capacity by 800,000 kw were under construction during 1957. The first of two 200,000 kw units at Huntington Beach steam station is scheduled for completion this summer and the second by the end of the year or early 1959. A similar expansion is under way at the company's Mandalay steam station near Oxnard, Calif.

• **20th Century Fox**—One of the largest construction projects expected to begin this year is a $400 million redevelopment program of the 20th Century Fox movie lot in West Los Angeles. Approximately 176 acres of the lot will give way to a project including seven office buildings, ranging from 3 to 30 stories high, 56 apartment buildings, a 4,000 seat auditorium, a shopping center and restaurants. The dominating structure will be a 1,000 room hotel.

• **University of California**—At the eight-campus University of California, well over $38.7 million worth of construction was under way during 1957. This included $13 million at the Berkeley campus; $12 million at the medical school and hospital in San Francisco; $10 million at Los Angeles; $2.7 million at the agricultural college at Davis; as well as smaller construction programs at other campuses.

• **IBM plant**—International Business Machines, Inc. completed its new multi-million dollar plant near San Jose, Calif., in November, a project which was started in the spring of 1956. The one story buildings, located on a 210 acre site, are of tilt-up concrete slab construction, and provide facilities for manufacturing, customer education and research.

• **Exhibit hall**—At the end of the year, San Francisco's underground civic center exhibit hall, started in the fall of 1956, was 70% complete. It is scheduled for completion March 1. The 140,000 sq ft building provides two acres of exhibit space in one room, and will be suitable for 90% of all industry shows. Cost of the building is $4 million. It is financed mainly by a $3.3 million bond issue.

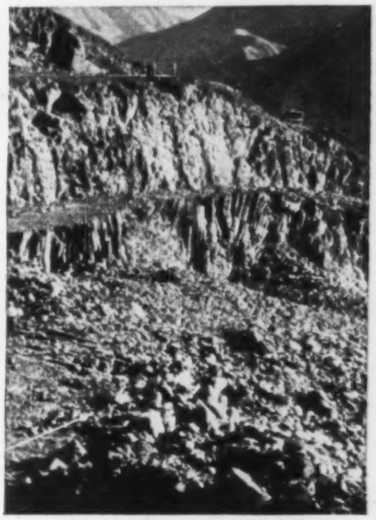
• **Scattergood Power Plant**—The Los Angeles Department of Water & Power started construction last year on its $61 million Scattergood steam electric generating plant on the ocean front near the Los Angeles-El Segundo boundary. The plant was 20% complete at the end of the year. Its ultimate capacity will be at least 1.2 million kw.

NEW RESULTS OF MONSANTO RESEARCH IN USE OF AMMONIUM NITRATE AS AN EXPLOSIVE

Typical shot with Monsanto's new kind of prilled NH_4NO_3

View of area involved in the blast. Shot was made in heavy columnar basalt at dam site. Used as an explosive: a new, top-quality, prilled NH_4NO_3 that Monsanto research developed to give you optimum savings, safety, speed and ease of handling.

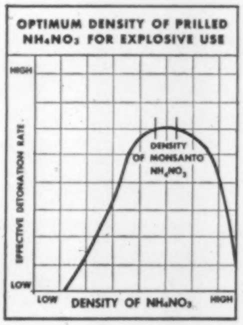
View at time of detonation. The system of detonation recommended by Monsanto, in conjunction with Monsanto Ammonium Nitrate, will yield equivalent pound-for-pound results with 60% gelatin dynamite at one-fourth the cost.

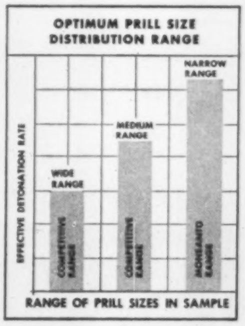


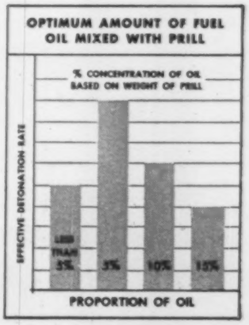
Results of blast. The powder factor in the shot above was 0.4 lbs. per cubic yard. Breakage of rock was considered ideal by contractor. Monsanto's experienced staff can give you complete technical service. Just phone Monsanto.

Photos courtesy of Morrison-Knudsen Company, Inc.

Monsanto Ammonium Nitrate is now produced according to the specifications determined by these findings of Monsanto research. Result: more effective blast at greater savings. Monsanto is the world's largest manufacturer of prilled ammonium nitrate—and leader in developing the use of NH_4NO_3 as an explosive for open work. Request report presenting latest research findings.







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Like most everything else, equipment costs have gone up and are still rising. The U. S. Bureau of Labor Statistics price index for construction machinery rose 6.7% over a year ago—and that figure doesn't include the recent price increases averaging 7% by equipment manufacturers.

But highway bid prices have held the line in the face of these higher equipment and labor costs. According to the composite mile bid price index of the U. S. Dept. of Commerce, there's been an increase of only one-tenth of one percent in the past year. Common excavation bid prices were up only 1.5% in the same period.

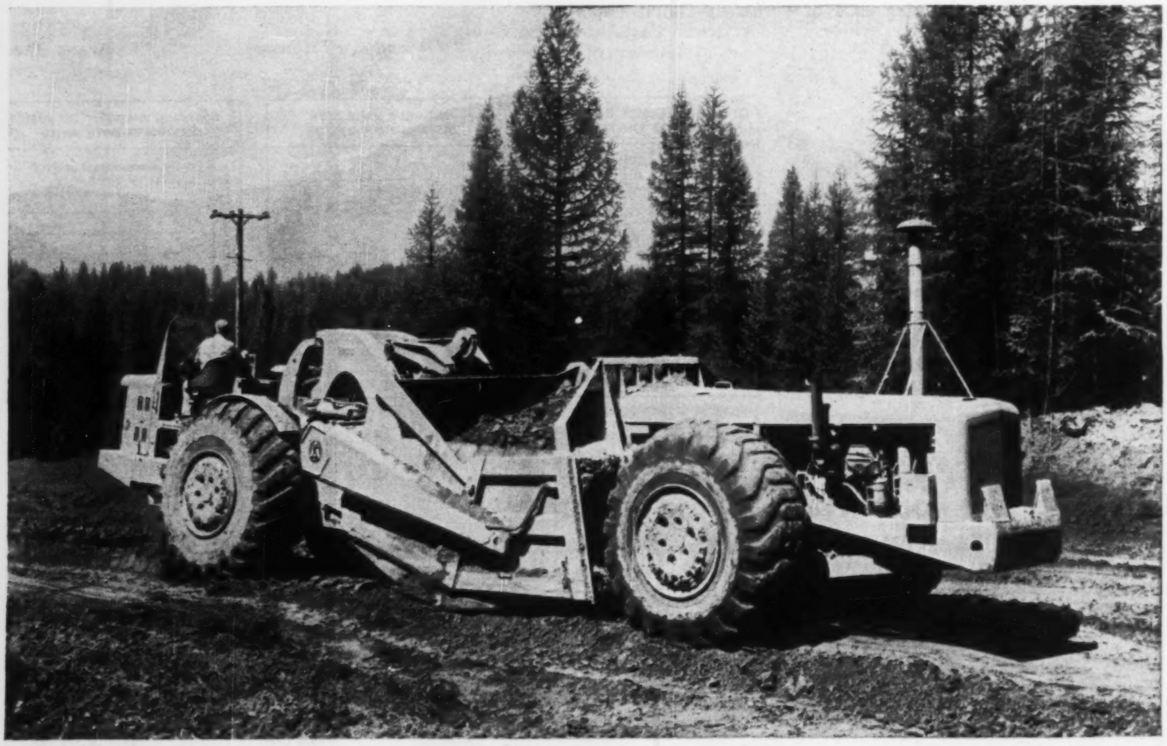
Costs Up . . . Profits Down

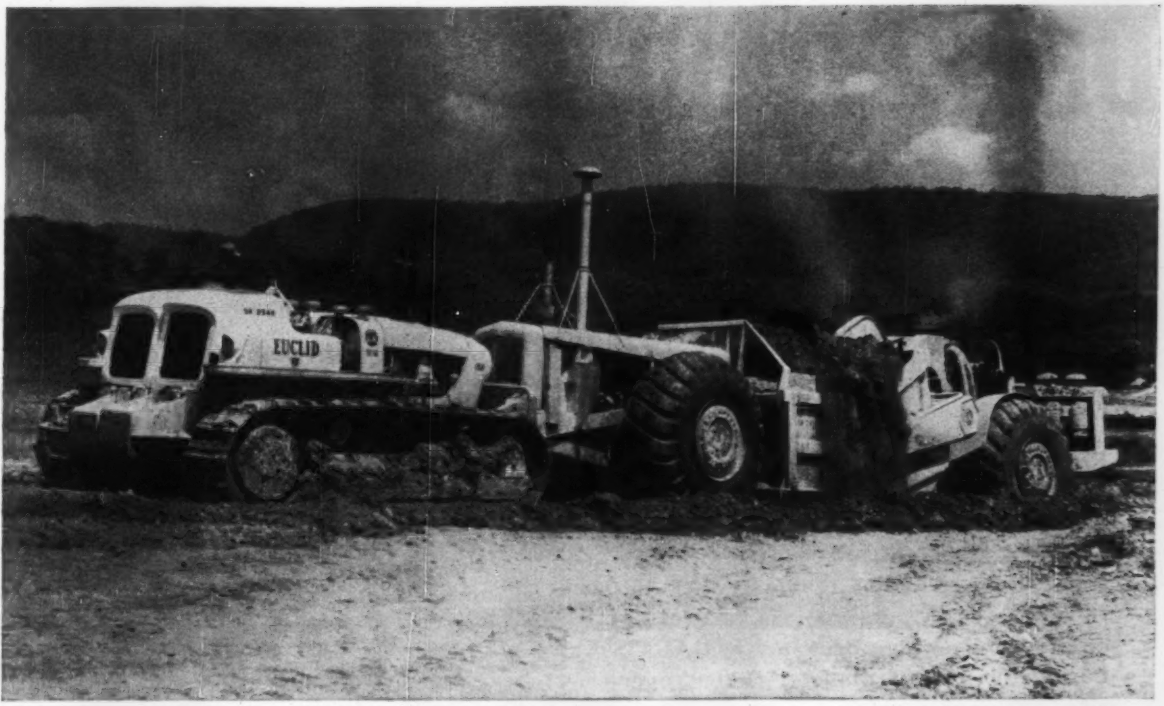
The obvious result of these higher costs, with bid prices remaining almost constant, is a real squeeze on the profit margin. It's probably the biggest factor in the 22% increase of business failures among contractors over last year. Net profits shrink fast under these conditions unless men and machines produce more. How to get this increase in production is the problem facing most dirtmoving contractors.

What's the answer?

With competition keeping bid prices almost constant, and with equipment and labor costs going up, modern earthmoving machines are the best bet to protect profits. Careful cost analysis may show that a partial replacement of your equipment—using a more efficient tractor for push loading scrapers, as an example,—would pay off in more yardage. Or your study may show that a change-over to other sizes or types of equipment would improve profits by a good margin.

The "Twin" Scraper has unequalled work-ability . . . works efficiently as a one-man earthmoving spread because it self-loads and can handle a wide range of assignments.





On big yardage, high production jobs the "Twin" team of Euclid TS-24 Scraper and TC-12 Crawler moves dirt faster and cheaper than any other combination of equipment—under good conditions or on the toughest going you've ever seen.

For instance . . .

Let's assume you're using a spread of three 18 yd. scrapers push loaded by a 200 h.p. tractor . . . job management is excellent and operating conditions on all phases of the project are good . . . but you bid close and your profit margin is pretty thin. To move more yardage you consider using a bigger tractor to get better loading performance with these three scrapers. One manufacturer has pointed out that this larger crawler could boost production by 20% and effect a 12½% reduction in cost per yard. That's certainly a big improvement in your profit picture.

But suppose you want to obtain the maximum profit potential from your job . . . you consider another possibility . . . the use of Euclid "Twins" in place of your original equipment spread. Again assuming the same job conditions, here's what the production and cost figures would show. With 2 Model TS-24 Twin-Power Scrapers and a TC-12 "Euc" Crawler, you'd get 45% more yardage than you would with the spread of 3 scrapers and 200 h.p. tractor . . . and you'd save 23% in your cost per yard. If job conditions were really tough, the return on investment would be even greater. It's earning power like this that has helped contractors with "Twins" beat the profit squeeze on all kinds of work.

On the Highway Program

Euclid Twin Scrapers and Crawlers are moving the cheapest dirt in all parts of the country. On the Illinois Toll Road, for example, 8 contractors are using a total of 50 "Twins" and many of these 24 yd. "Eucs" work under adverse conditions that stall other scrapers. More and more contractors are finding Euclid "Twins" have more earning power than any other equipment. If you haven't checked the facts and figures, have a Euclid Dealer show you why "Twins" give you a bidding advantage and are your best investment.

Engineered to fit the job . . .
Euclids are your best investment

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EUCLID DIVISION
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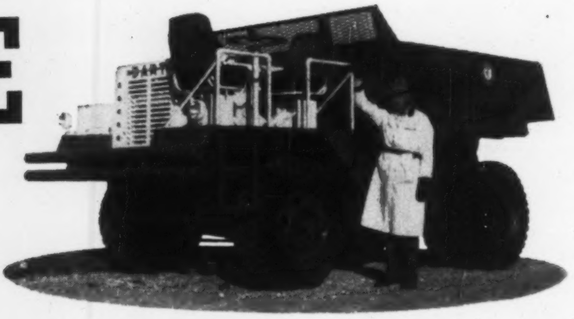
DEPENDABLE DARTS

TONNAGE ENGINEERED TO MEET YOUR REQUIREMENTS



"10 SUG UNDERGROUND" — DART'S 10 Ton Underground Shuttle Truck has 6 cu. yd. rock body. 125 H.P. Diesel Torque Converter-Transmission with 3-speeds "forward and reverse" exhaust scrubber. Dual controls.

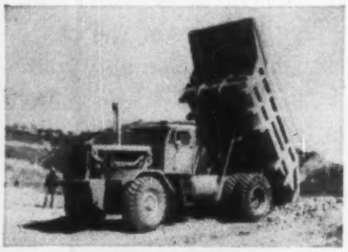
For over 53 years, the DART TRUCK COMPANY has specialized in custom trucks. Today's standard production model off-highway units are in a wide tonnage range with a variety of optionals to meet performance needs. Advanced engineering and features such as DART'S box girder frame, planetary axles, oversize bearings and many others assure dependability and lowered cost-per-ton haulage.

There is a DART man near you who can help you solve your haulage problems.

"10 SL" —— 10 Ton DART "Jr. Workhorse", 165 H.P. diesel, double reduction rear axle. Maximum power and speed to meet rugged conditions.

"15 SL"

15 ton DART with 175 or 220 H.P. diesel. Single and three-stage converters optional. 11-cu. yd. rock body is standard equipment.

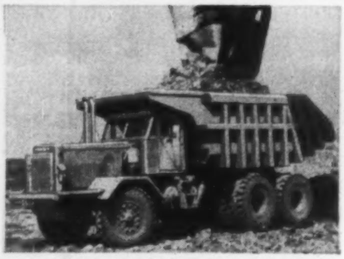


"35SL"

35 ton DART powered by 400 H.P. diesel, 3-stage converter and 3-speed transmission (optional single-stage converter and 4-speed semi-automatic transmission.) 110,000 lb. planetary drive rear axle.

"DART 25SL"

25 ton capacity. 300 to 335 H.P. 3-stage converter and 4-speed transmission (optional single-stage converter and 4-speed semi-automatic transmission.) 100,000 lb. planetary rear axle.



"DART 50 T"

50 ton capacity, powered by 400 H.P. diesel. Rock body is 31 cu yds. (struck) and has 2 four-stage telescopic hoists. Hauling speeds to 25 MPH, return speeds to 30 MPH.

***POWER* for the Climb — *SPEED* for the Haul Road**

Write for complete specifications.

DART TONNAGE ENGINEERED TRUCKS

Kansas City 8, Missouri

SUBSIDIARY OF THE CARLISLE CORPORATION

D-138

Symbolic of the U. S. highway program and its problems is this interchange near Dayton, Ohio. Many types of construction, elaborate interchanges, great areas of land are necessities.

Roadbuilders Dominate the Scene

For the second year in a row—as it will be for many years to come—there was no question in 1957 as to the top-interest story for construction men concerned with transportation. The story is, of course, the great Interstate Highway Program, its problems and its great promise for the future.

The story isn't in the fact that the program was under way. Rather, it grew from efforts to gage how the program was doing. And efforts to measure progress gave rise to disappointment, some heartache, some hurt in the business pocketbook—and much hope, hard work and progress.

There was the hard-held American belief that once the button was pushed—once the highway bill was signed and large amounts of money were made available—new roads would appear across the countryside like paste being extruded from a giant tube. And with these roads, just as magically, would come great gobs of money spent for machinery, materials and work.

Things didn't materialize quite that way during 1957. There was much criticism, and, under pressure from home, Congress got querulous too.

The facts are that the program has been moving, as its managers have insisted, almost exactly according to schedule. What was lacking was a proper yardstick for measuring that progress. It took the construction industry almost a year and a half to agree on such a yardstick, amid a welter of statistics that only succeeded in confusing things.

The most acceptable yardstick turned out to be the figure on obligation of federal funds for specific jobs. This figure—an actual commitment of an

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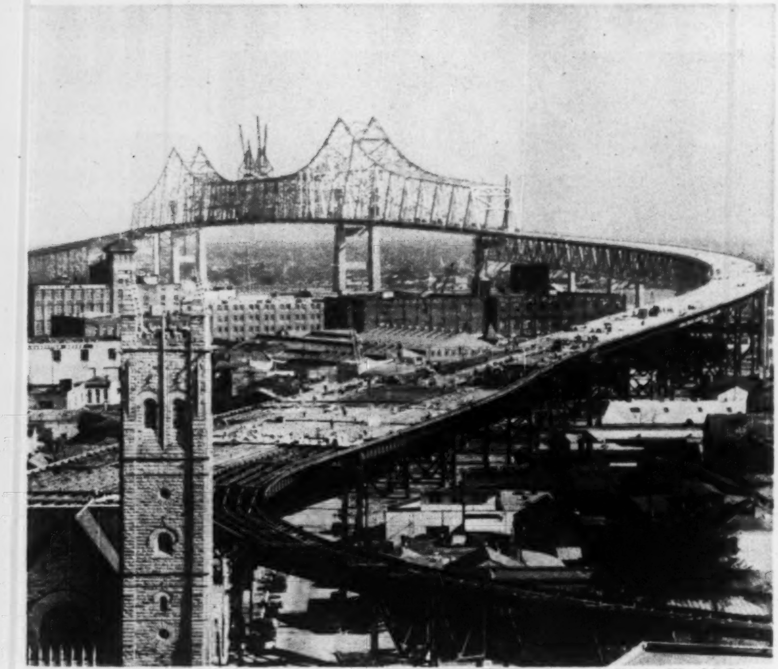
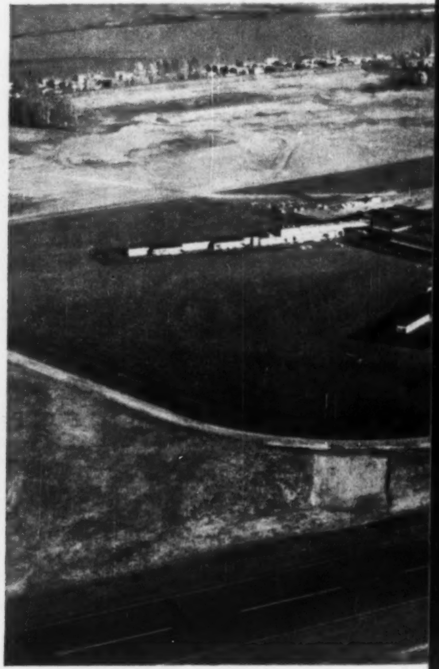


Wide World Photo

NEW ORLEANS TOLL BRIDGE over the Mississippi River will be ready for traffic in March of this year. The 2.3 mile project will cost $65 million.



ELEVATED FREEWAY along San Francisco's Embarcadero will be a double-deck

Highways dominate, but transit comes in too . . .

actual sum of money to pay for a specific part of the roadbuilding job—can be used in much the same manner as "contract award" figures are used in general construction statistics. The spending of the money may be spread over a period of time—but the money certainly will be spent for a definite purpose.

With this kind of a yardstick, it is possible to determine that the program is on schedule—even though it has produced an extremely small number of miles of finished, new road (46, to be exact, as 1958 started). What it has produced is an enormous amount of preliminary engineering work; right-of-way acquisition; technical investigation and standardization; many contracts for preliminary work such as grubbing and clearing, subgrade preparation, structures and the like—all necessary preliminaries to full-scale paving operations.

But the yardstick also showed up a number of distressing facts:

- **Progress of the program has been badly unbalanced, from a geographical point of view.** This is attributable in large part to the formula under which federal funds have been allocated in the first three years of the program, based on post-road mileage, area and population—rather than need. Under this formula, states with small populations but great areas (like Nevada) got more federal money in the first three years than their hard-pressed highway agencies actually could handle, while states with big populations and smaller areas got far less than they could handle.

The current session of Congress, which must apportion money for succeeding years, will without question remedy this situation with a new apportionment formula.

- **Costs were going up at a startling rate in comparison to original estimates on which the 1956 highway act was predicated.** The actual jump in costs over estimates was in the neighborhood of 37%, according to the Bureau of Public Roads. Greatest single cause was the insistence by Congress, in writing the 1956 law, that the interstate roads also must serve local traffic. This meant a substantial increase in the number of access roads, interchanges and structures, over that which was originally planned.

With the increase thus dictated, land prices—and quantity of land needed—had also jumped substantially. Construction and materials cost rises contributed too—but not in a relatively high proportion.

- **The heavy, and deliberate, emphasis in the first two years on preliminary engineering and right-of-way acquisition had drained off a rather large part (37½% to be exact) of all money spent on the highway program.** This cost would level out and decline as the program went along—but some of the early dollars that machinery manufacturers had counted on weren't going into construction contracts, but rather to the engineers and landowners.

One of the brighter results of looking back at the program is that the much-feared shortage of engineering personnel quite obviously hasn't been too much of an obstacle.

Engineers are still in short supply true enough, but by increasing the efficiency of existing staffs, increasing use of calculators, computers, standard designs and photogrammetry, the states were meeting the shortage head-on—and winning out.

On the subject of computers it is particularly encouraging that real efforts are being made to build up for the machines libraries of standard programs that can be adapted to the needs of any user. The Bureau of Public Roads is gathering such a library, as are a

structure linking Bay Bridge and Bayshore Freeway.

AIRPORT improvement for Portland, Ore., includes new terminal fronted by some 40 acres of asphalt loading area for planes.

number of private groups of engineers and highway departments which use specific types of machines.

• **Science advances**—On the science side, too, much had been accomplished by the year's end. A set of standards for bridges on the interstate system had been published; another set of standards—relating to the important subject of signs for the new roads—was out for approval or criticism by the state highway departments.

The newest test road at Ottawa, Ill. is under construction—despite a serious delay occasioned when first bids were asked (proponents found to their dismay that contractors were afraid to bid on the job of building a deliberately bad road). The delay was fortunate, however, from a scientific viewpoint, in that it permitted better instrumentation, better staffing and more detailed planning than otherwise would have been possible.

As of year's end, much construction of sub-base, some of the turnaround loops, more than half the test bridges and some of the instrumentation had already been completed.

Another factor of increasing interest to the highway planners was an unusual one—it concerned psychology. Forced by the terms of the highway act to hold public hearings on nearly every plan for a new road, the highway engineers suddenly found themselves in a world that didn't have the precise boundaries of their normal engineering pursuits. They were in a world of human emotions—and some of those emotions are raw in the extreme.

For the first time in many years researchers found they had to turn their attention to such matters as the psychological effect of a new road on the living habits of a given community or group of people; on the effect of the change in relationship between city and suburb, city and rural area.

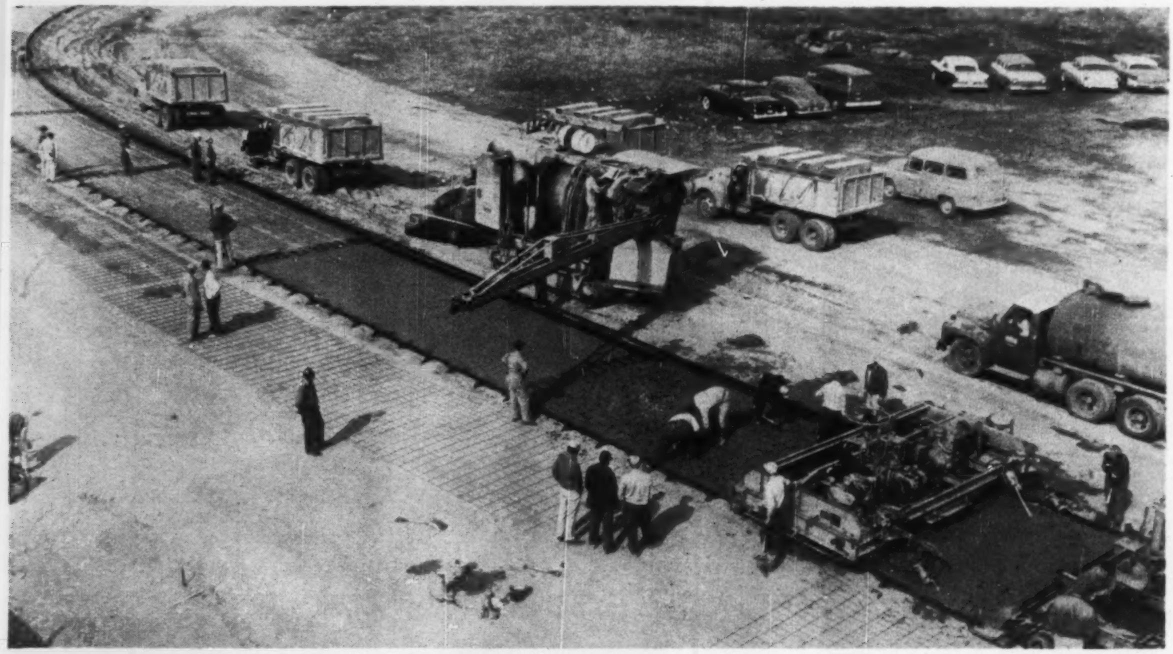
The growing science of traffic engineering has had as its base a psychological relationship—that of the driver to his environment, his vehicle. But it is becoming increasingly apparent that the road itself is a major factor in community psychology—and has a lot to do with the number of accidents besides. One psychiatrist, speaking before a recent highway meeting, commented on an upstate New York city where—among other things—juvenile delinquency increased rapidly while the community was wrangling over the routine of a new road and then dropped markedly when the route was finally settled—out of the community's central area.

• **Transit**—From the general problem of the highway program flowed some searching investigations into the problems of urban transit.

Admittedly, this is currently a special problem of a dozen or so major metropolitan centers—although nearly every community of whatever size is becoming increasingly subject to traffic jams. And, in view of predictions that a vast majority of Americans will be living in super, overlapping cities within the next 25 years (a so-called "interurbia"), the transit problem is serious.

Obviously, highways alone are not the answer to the problems of the urban centers—no highway ever built will have capacity to cope with the ever increasing flood of motor vehicles. With this fact becoming clearer, planners everywhere are beginning to think in terms of transporting people—not vehicles—into the central cities.

And this sort of thing inevitably has led to reconsideration of railroad-type operations on separate rights-of-way where schedules can be maintained without regard to momentary traffic conditions. Whether this transit system should be above or below ground is hardly debatable, since costs of subterranean construction are generally out of sight in city areas. What form the facility should take if elevated is subject to a great deal of debate. The "elevateds" of New York, Chicago and



TURNAROUND PAVING of test loops of the AASHO road-test project at Ottawa, Ill. was begun last fall (1957), using portland cement concrete at one end of each loop and asphaltic concrete at the other.

Highways dominate, but transit problem gets tougher

Boston were and are unsightly, noisy breeders of dirt and shadows. The fact that all of them were built late in the 19th and early in the 20th century seems to have slipped the public mind—all proposals for "elevateds" are immediately lumped with the old image. What has captured the public fancy is the streamlined look of proposals for monorails of some type—even though there are many questions in their operation that have not been answered, and in fact, no really full scale test of the system has been made under actual operating conditions.

The somber note in all these considerations is the fact that rapid transit cannot pay for itself out of its own revenues—one-way traffic (morning and evening) can't, apparently, be made to cover costs. So, some form of subsidy by the community seems inevitable. A proposal for a New York-New Jersey loop subway, for instance, envisaged a yearly operating deficit of about $12 million to be made up by taxes on the communities served.

Further complicating this matter is the plight of the railroads—which already own and operate some of the facilities that could be used for a rapid transit network. Despite fare raises and some improvements in service, the commuter railroads have all claimed they are losing heavy sums on their operations and have been petitioning for reduced service—or even complete abandonment of such service.

• **Ports and Harbors**—Under the spur of a competitive situation that will be presented when the St. Lawrence Seaway is opened a year hence, another form of transportation took a surging new lease on life.

After construction doldrums that extended in some cases back to the period following the Civil War, East Coast seaports suddenly came alive with plans and work designed to keep them in competitive position with the new ports that would be open on the Great Lakes.

The great port of New York is undergoing the beginnings of a planned $286 million face-lifting, carried on in separate programs by the bi-state Port of New York Authority and the city's Department of Marine and Aviation, that will replace many of the city's inadequate pier facilities with fewer new ones—but will result in a net gain in capacity through development of greater efficiency.

The Port of Boston—with a newly created port authority to direct its activities—was also well into a somewhat selective port improvement program. Baltimore—perhaps the most vulnerable of East Coast ports because its shipping business depends in large part on favorable freight rates—looked to a new state-backed port authority to improve its status. Philadelphia—already well on the upgrade in port business—continued public and private moves to rehabilitate its waterfront area.

Further down the coast, North Carolina's legislature authorized more than $20 million for its ports at Elizabeth City and Wilmington. On the West Coast, San Francisco, Los Angeles and Long Beach, in particular, pushed ahead.

Along the Great Lakes, too, Montreal, Toledo, Detroit, Chicago, Erie and other cities that see prospects of becoming deep-sea ports, began to stir along their lakefront areas. New grain terminals, improvements to docking facilities and better rail and road connections to the waterfront areas were in the wind.

• **Tunnels and bridges**—While the emphasis remained on the construction of highways, vital facilities were added to the nation's highway network in the form of three huge, subaqueous traffic tunnels (plus a fourth smaller one) and numerous new bridges.

The four tunnels, in the order of their opening to traffic, are:

The $100 million, two-lane, mile-long third tube of New York's Lincoln Tunnel, a shield-driven tube to expand the traffic capacity of one of the busiest interstate connections to six lanes (four

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MACKINAC BRIDGE—the world's longest suspension bridge—was opened to traffic Nov. 1, 1957. The $100 million, four-lane bridge carries toll traffic across the Straits of Mackinac.

JOHN C. LODGE EXPRESSWAY in Detroit, with 8 miles now in service and 0.4 mile to be opened to traffic this year, will be completed by November 1959.

. . . Bridges, tunnels to the fore . . .

in the direction of heaviest use), was opened May 25.

The $4.5 million, four-lane, 1,080 ft Harvey tunnel (smallest of the four) built within cofferdams across the Harvey Canal, to form a vital link in communications along the West (south) bank of the Mississippi River opposite New Orleans was opened Sept. 5;

The $60.5 million Hampton Roads bridge and 7,000 ft. trench-type tunnel at Norfolk, Va., connecting Norfolk and Hampton in a single-tube, was opened to traffic November 1;

The $130 million, 7,650 ft twin-tube Patapsco River tunnel at Baltimore, largest trench-type tube yet built was opened to traffic November 31.

One other major vehicular tunnel—the 3,430 ft twin-tube Fort Pitt Tunnel to connect downtown Pittsburgh with parkway systems leading to the west—was under way, with conventional rock-mining techniques. And Virginia appropriated a quarter-million dollars for engineering investigations of a causeway-tunnel across the mouth of Chesapeake Bay, to connect the DelMarVa peninsula near Cape Charles with Norfolk.

The bridge builders, however, had a spectacular year—with more to come.

Without question, their biggest achievement was realized when the huge Mackinac Straits suspension bridge was opened to traffic November 1 (even though some construction phases will continue into late this year). At 8,614 ft between anchorages, it will be the world's longest suspension bridge, although its 3,800 ft main span will be short of the 4,200 ft center span of the Golden Gate Bridge. Total length of the $100 million structure is 17,913 ft.

Three other big crossings—independent of turnpike construction—were thrown open during the year: The $90 million Walt Whitman suspension bridge across the Delaware at Philadelphia; the 7,793 ft continuous girder Kingston-Rhinecliff Bridge across the Hudson River; and the four-mile-long, $68 million Richmond-San Rafael bridge in California. And on the Connecticut Turnpike are two of the nation's largest bridges—the $12.1 million, 2,679 ft crossing of Bridgeport Harbor and the 3,769 ft Quinnipiac River (containing the longest U.S. continuous girder span—387 ft).

There is plenty more bridge work on the fire. The projects include the $90 million Throggs Neck span over New York's East River, the $167 million second-decking of the George Washington Bridge, the $65 million, 3,020 ft cantilever structure now building over the Mississippi at New Orleans and the huge Carquinez Straits bridge over the northern arm of San Francisco Bay. These structures are in various stages of completion—the two New York jobs having just started as the new year got under way; the New Orleans bridge being due for completion in March; Carquinez Straits, about 70% completed.

There are many other bridges under construction: the $88 million Calumet Skyway near Chicago, a $14.5 floating bridge across Hood Canal near Seattle and a $9 million, 5,820 ft structure at Corpus Christi, Tex.

And—though it is not a bridge—there is the roughly 35% completion on the Southern Pacific's 13 mile causeway that will replace a trestle across the Great Salt Lake, starting near Ogden, Utah.

• **The turnpikes grind down**—The year 1957 brought completion of seven toll roads (two were extensions of the main stems of existing roads), as the great surge of toll-road construction ground toward what appeared to be an inevitable end.

The only totally new tollroad now

Another BRIDGE MODERNIZATION PROJECT
FOR A BETTER CHICAGO-
SORRY FOR TEMPORARY
INCONVENIENCE....
RICHARD J. DALEY
Mayor

CHICAGO'S 37-year-old Michigan Avenue bridge —a six-lane double-deck, double-leaf trunnion bascule—was rehabilitated last year under traffic at a cost of $900,000.

AMONG THE WORLD'S BIGGEST GRADING OPERATIONS, this 9 million cu yd cut and fill through California's famed "golden hills" will provide access to new Carquinez Straits bridge.

. . . Airfields get attention . . .

under construction is Illinois' 187 mile turnpike, now in final grading stages. Extensions and additions still under construction, however, include the Berkshire and New England additions to New York's Thruway; a 20 mile extension of Oklahoma's Will Rogers Turnpike to join the Turner Turnpike, and the $88 million Calumet Skyway connecting Indiana's tollroad with metropolitan Chicago.

In completions, Florida opened its 108 mile Sunshine State Parkway late in January, but ran into some trouble within a short time when pavement subbase on an 11 mile section proved unstable. The damage was quickly repaired however. New Hampshire completed work on its two tiny turnpikes (a total of 64 miles); the Will Rogers pike was completed for its planned 88 mile length; Pennsylvania completed its Northeast Extension to Scranton and New York threw open its Erie Thruway at the western edge of the state.

Last of the major turnpikes to open was Connecticut's 129 mile Turnpike, which runs between the New York and Rhode Island statelines. But the $445 million road had two major gaps: A large bridge over the Mianus River, near the western end, and a bridge over the Byram River, which marks the New York-Connecticut line. This latter structure—being built by New York as part of the New England Thruway —won't be finished until late this year. Meanwhile, Connecticut pike traffic must take the Boston Post Road.

• **The airports**—Although somewhat in the shade of the highway program, airfield designers were making some steady gains of their own. Through the unveiling of military airfields, engineers were beginning to get a practical look at what future airfields might require.

On the civilian side, possibly the most spectacular look into the future was the formal opening of the Port of New York Authority's $100 million "Terminal City"—situated not at the edge, but in fact at the very center of huge Idlewild Airport. PNYA coupled the Idlewild opening with start of work on an elaborate scheme to modernize older LaGuardia Field on the north shore of Long Island. At Idlewild, engineers and planners finally dropped the idea that airfield facilities (so far as passengers and freight are concerned) should consist of a single central building through which all passenger traffic must flow. There was reason of course: such central terminals eventually become so huge as to be inefficient and confusing—or else hopelessly overcrowded in a very short time.

At Idlewild, there is a central building of vast extent—but it is for service to passengers of foreign-flag airlines only, and concentrates within it needed facilities such as customs and immigration services. But passengers on U. S.-flag lines will report directly to buildings built by the individual airlines themselves—where all facilities are aimed at servicing only the airline's own customers.

PNYA also planned to eliminate the old terminal building at LaGuardia, building in its place a two-story structure of considerable length served by vehicle ramps. Individual airlines will occupy sections of the structure extending from the loading ramp through to the airfield itself—and passengers will be delivered directly to the section occupied by the airline of their choice, eliminating unnecessary contact with other lines or passengers.

Other cities, such as Houston, Dallas, New Orleans and Los Angeles, were at work on their own terminals—not following precisely this pattern, but in general aimed at bettering passenger and freight handling.

The military, meanwhile, unveiled details of some of its major jet bases, and thus gave civilian designers a look at the demands imposed by heavier,

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- EASIER, FASTER OPERATION . . . Air cylinders operate bin gates, weigh-box, asphalt injection, charging asphalt bucket and mixer — all operated from central station on end of plant.
- GREATER PRODUCTION . . . Up to 400 T.P.H. on a 36-sec. charge, mix and discharge cycle.
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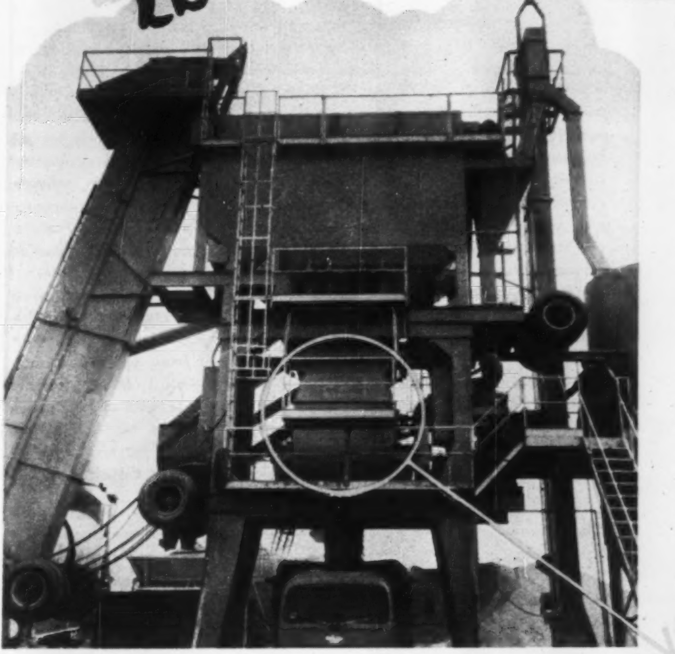
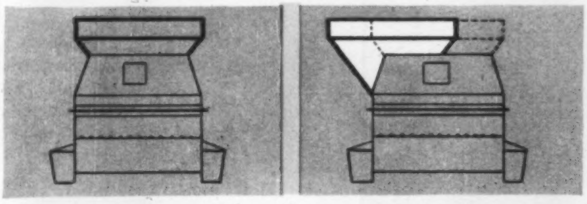
- . . . and EASIER ACCESSIBILITY as indicated by the exclusive MADSEN Roll-Away Weigh-Box feature shown below.



From the standpoint of easy servicing and maintenance, the roll-away weigh-box in the Model 481 is considered one of the most outstanding MADSEN features. By removing only 8 housing bolts and unlocking a U-joint from scale lever – the entire weigh-box assembly may be rolled away from the top of the mixer in a matter of minutes, completely exposing the mixer for easy mixer tip or shank replacement.

EXCLUSIVE MADSEN ROLL-AWAY WEIGH-BOX

. . . another big time and labor-saving feature in the MADSEN Model 481.



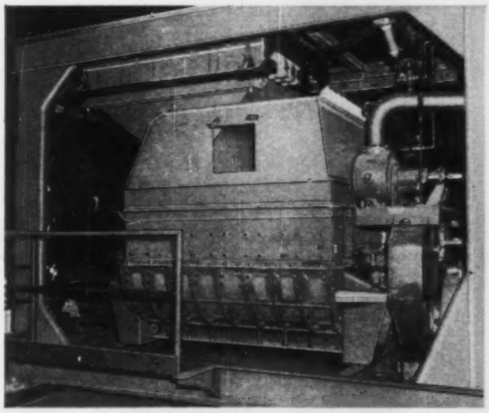


Photo above and drawings at left show how the mixer weigh-box assembly rolls away from the top of the mixer for easy, quicker servicing of mixer tips and shanks.

FOR YOUR CONVENIENCE—MADSEN MAINTAINS A COMPLETE PARTS STOCK IN LOS ANGELES AND LIMA, OHIO

Ask your MADSEN Distributor for Catalog No. 800 or write MADSEN Works Baldwin-Lima-Hamilton Corporation P.O. Box 38, La Mirada, California.

THE MADSEN LINE OF PRODUCTS FOR THE ASPHALT PAVING INDUSTRY

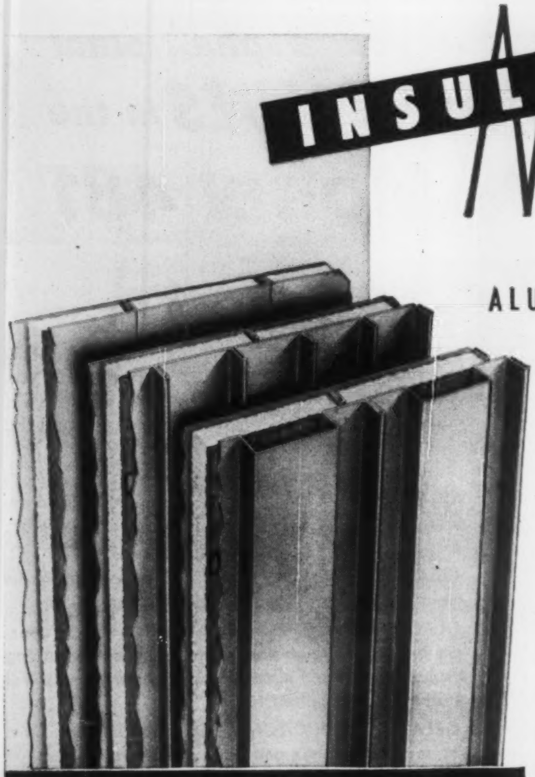
**ASPHALT PAVING PLANTS • PUG MILL MIXERS • AGGREGATE DRYERS • DUST COLLECTOR UNITS
ROAD PUG TRAVEL-MIX PLANTS • WEIGH BATCHERS • SUPER FLOAT AND JOHNSON FLOAT FINISHERS
ASPHALT TANKS • ROYAL CROWN PUMP VALVES • ASPHALT AND FUEL PUMP UNITS**

MADSEN WORKS
BALDWIN-LIMA-HAMILTON
CONSTRUCTION EQUIPMENT DIVISION
DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Lima • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

INSULATED METAL WALLS

for INDUSTRIAL and COMMERCIAL BUILDINGS

ALUMINUM, STAINLESS or GALVANIZED STEEL



FLUSH, RIBBED, or FLUTED
Over-all "U" Factor is Superior to a Conventional Masonry Wall with Furred Lath and Plaster

The low-cost permanence of Insulated Metal Curtain Walls are today being designed inte an ever broadening range of building types. In the Eastland Shopping Center, illustrated below, you see an unusual building in which Mahon Metal Curtain Walls in harmonizing colors were used in combination with other materials to produce an attractive and colorful exterior. Some of the country's outstanding designers have employed Mahon Insulated Metal Curtain Walls to good advantage in producing striking exterior effects in office buildings, shopping centers, schools, armories, military barracks, sports arenas, parking garages, warehouses, and industrial buildings of all types—including powerhouses. From a cost standpoint, Metal Curtain Walls save as much as 50% of the cost of masonry walls in some types of buildings. In Mahon Insulated Metal Walls, vertical joints are invisible—symmetry of pattern is uninterrupted across the wall surface . . . and, the field constructed walls can be erected up to sixty feet in height without a horizontal joint. These two design features, which are extremely important from an appearance standpoint, were engineered into Mahon Insulated Metal Curtain Walls to give you a finer appearing wall surface with a continuous pattern free from unsightly joints. You'll want these Mahon "better look" features when you select a metal curtain wall for any type of building. See Sweet's Files for information, or write for Catalog W-58.

THE R. C. MAHON COMPANY • Detroit 34, Michigan
Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Insulated Metal Curtain Walls and Wall Panels; Underwriters' Rated Metal-clad Fire Walls; Steel Roof Deck and Long Span M-Decks; Permanent Concrete Floor Forms; Acoustical and Troffer Forms; Electrified M-Floors; Rolling Steel Doors, Grilles, and Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters.

NATIONAL BANK OF DET

Eastland Shopping Center, Detroit, Michigan. 56,000 Sq. Ft. of Mahon Insulated Metal Curtain Walls and 48,000 Sq. Ft. of Mahon Steel Roof Deck were employed in the construction of this outstanding and colorful structure. Victor Gruen & Associates, Architects. O. W. Burke Company, General Contractors.

MAHON

VARIATIONS IN GRADE of more than 80 ft, plus the problem of working between a built-up city area and a railroad marshalling yard, were part of the job for builders of Virginia's Richmond-Petersburg Turnpike.

HITTING THE DITCH—a trio of crawler tractors lower-in 51.9 mi natural gas pipeline job between Morris, Ill., and Chicago. An average of 4,000 ft of pipe is being put in during the 10-hr day, with production reaching as much as 6,400 ft daily.

. . . Equipment still a worry . . .

faster, thin-winged jets already in military operation and soon to enter the civilian airways.

What the military indicated was runways of enormous length—an average of 13,500 ft of paved runway, with widths of 300 ft or more and with paved "blast pads" extending another 1,000 ft at either end of the main runway.

Also, the military was calling for extremely smooth runways—with tolerances on the order of $\frac{1}{8}$ in. of surface variation in 12 linear feet in either direction—to lessen the chance of shock or loss of control in the fast landing jets.

The controversy over whether these runways should be paved with flexible or rigid paving materials was far from over—but a compromise seemed possible, at least as demonstrated on some of the military bases: A rigid pavement at the ends of the runway, where the planes first touch down, possibly a flexible pavement in the center portion.

Another point the military were making was this: The newest aircraft no longer need the familiar diamond of runways in three directions—a single runway in the direction of the prevailing wind seems enough, since new landing gear permits most cross-wind landings with safety. But as a corollary, much study is now being given to superelevated, high-speed turnoffs along the runway, to permit a just-landed plane to turn off the runway at comparatively high speeds; thus clearing the runway for greater landing or takeoff capacity.

• **Equipment**—Big question mark for the large segment of the construction industry concerning itself with highways was the purchase of equipment.

The problem isn't new of course: One method by which contractors finance themselves long has been that of obtaining discounts for machinery purchases—or buying the machinery on credit terms that permit the contractor to retain his cash on hand to meet other expenses until he begins to receive payments from the owner. Trouble is—from the dealer's viewpoint—that most manufacturers don't want to back the dealer with their own credit. Unlike the automobile dealers, most construction machinery makers insist that the dealer purchase outright the machines in his showroom—so credit problems with the dealer's customers are his own problem.

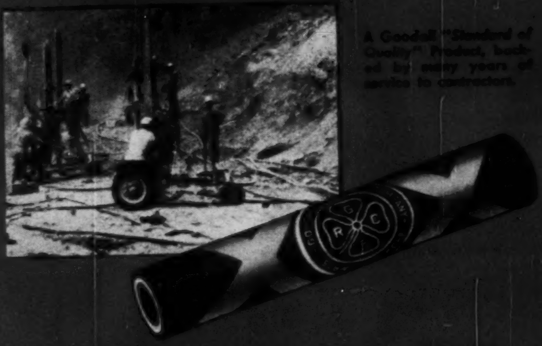
And the dealers—few of whom are in a position to shoulder the full load of credit through their own resources—have been finding it harder and harder to place contractors' "paper" with lending agencies.

As the new year started, however, the dealers were being supported by one major manufacturer (Case) who was encouraging purchases on a lease-purchase plan (already employed by many dealers). Under this plan, a contractor

SPECIFICATIONS *to Help You*

SPEC. D-8

"SUBWAY"® AIR HOSE



A Goodall "Standard of Quality" Product, backed by many years of service to contractors.

"Subway" is built with that extra measure of strength and durability that assures uninterrupted delivery of maximum air power to the drills, even when the "going" is roughest. Light weight, flexible, easy to handle. Specifications include oilproof tube; highest quality wrapped duck carcass; wear- and weather-resistant red rubber cover, with new crisscross yellow stripe for positive identification. Sizes ½'' to 1¼'', I.D., in maximum lengths of 50 feet.

SPEC. N-135

"NEWTYPE" SUCTION HOSE

GOODALL RUBBER COMPANY
G
R
C
NEWTYPE SUCTION

Another Goodall "Standard of Quality" Product for both Suction and discharge.

Put "Newtype" on your pumps and watch them keep on giving their best . . . day-after-day. This quality hose will not kink, buckle or collapse, and has the great strength and durability to stand up longer under severest wear and abuse. Made in sizes 1¼'' to 4'', inclusive, in maximum lengths of 50 feet. Readily identified by a green spiral stripe on the black cover, plus the familiar "Clover-leaf" label.

SPEC. D-9

"ALLGOOD CORD"® MANIFOLD AND CAISSON HOSE

G
R
C
Standard of Quality

"Standard of Quality"

"Allgood Cord" . . . long famous for its outstanding strength and safety for three most important air hose applications—supplying air to Caissons where human lives are at stake; feeding air to Jumbos where a shutdown would affect not one but a battery of drills; and as a main air line to shovels in tunnel headings. Specifications include black synthetic tube; special kink-resistant wrapped duck carcass; wear-resistant white rubber cover. Sizes 1½'' to 4'', in maximum lengths of 50 feet.

SPEC. N-84

"INFERNO"® STEAM HOSE

GOODALL RUBBER COMPANY
G
R
C
INFERNO STEAM

"Standard of Quality" . . . the safest hose for pile driving and other heavy-duty steam applications.

"Inferno" is built with multiple layers of wire braid; a heat-resistant tube; and a tough, abrasive-resistant red rubber cover with outer black spiral to assure easy identification. The special wire braid construction will cause steam to be diffused from damaged hose, providing a safety factor against sudden burst. Extremely flexible. For pressures up to 200 lbs., and temperatures up to 400°F. Sizes ½'' to 2½'' I.D., in maximum lengths of 50 feet.

Keep Every Job Moving on Schedule

SPEC. N-3

"HARDROK"® AIR HOSE

A super-strong air hose for longer service life, with lower replacement costs, under severest drilling conditions.

Carcass made of horizontally braided steel wires, providing exceptional strength, durability and resistance to kinking, without impairing flexibility. Long-lasting Symplastic tube impervious to action of oil from the drill. Tough, wear-resistant yellow rubber cover with black spiral stripe for easy identification. Sizes ½'' to 2'', inclusive.

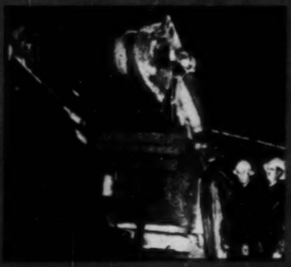
SPEC. B-11

"SUPER TRIPLE-S" CONVEYOR BELTING

Built for the big construction jobs where reliable, day-after-day performance keeps the job moving on schedule . . . at a profit. Heavy duck carcass, high tensile rubber covers and strong friction between plies combine to make "Super Triple-S" the perfect belt for the longest, heaviest hauls. Designed to carry crushed limestone up to 10'', aggregates, and ores, either wet or dry.

SPEC. B-74

"WEAR KING"® MUCKER BELTS



These belts, developed especially for use on Conway Mucking Shovels, have demonstrated their record-breaking strength and stamina on most of the largest modern tunnel jobs. Typical example: The 7,042-ft. railroad tunnel at at Bingham Canyon, Utah, where "Wear King" belts on some of the machines handled over 35,000 cu. yds. of excavated material without replacement.

"Wear King" construction provides highest resistance to continuous tension, terrific load impact, small-pulley flexing and ply separation.

SPEC. 80-81

RUBBER WORK SUIT

A rugged, waterproof Shaft Suit built to withstand the hard wear encountered in tunneling, mucking and other occupations in which the wearer is working continually in mud and water. Suit consists of No. 80 Jacket and No. 81 Overall—both dull finish rubber on natural sheeting.

The Goodall Waterproof Clothing Line includes other styles of jackets, overalls and suits, and a variety of coats, in rubber, oiled and latex.

SPEC. MB

"TOE-SAVER"® BOOTS

For maximum foot protection. Smooth, tough, flexible jet black rubber, heavy duck lined. Cushion insole for extra comfort. White cap over reinforced steel toe tested to withstand 3,000 lbs. pressure. Tire-tread soles. Hip, Spec. MB-346. Storm King, Spec. MB-780. Short Spec. 946. Permanently affixed size markings.

"If it's GOODALL it MUST be GOOD!"

The products briefly described here are merely selections from the complete Goodall Quality Line of Contractors' Hose, Belting, Clothing and Footwear for every type of service—backed by nearly a century of consistent quality and reliability. Contact our nearest branch for details, or write for catalogs.

Standard of Quality—Since 1870

HOSE · BELTING · FOOTWEAR · CLOTHING
AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.
BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES.
IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

can rent a machine by the month, for example, then apply his rental payments toward the purchase price should he choose to buy the equipment.

Several other manufacturers have also offered deals of this kind to their distributors.

But there is no question that the dealers themselves try to fight shy of any lease-purchase arrangements if they can. They contend that if too many such deals are made, they will wind up with large stocks of used equipment—at a considerable loss in sales value.

But—optimistic as always—the dealers are looking forward to a better 1958, confident they can find some answer to the problem of used-machinery inventories, train their sales forces for a harder sell that will bring them better business.

Major Transportation Projects

MIDDLE WEST
MIDDLE ATLANTIC
NEW ENGLAND
SOUTH
FAR WEST
WEST OF MISSISSIPPI

New England

• **Dow Air Force Base (Bangor, Me.)**—More than $10.4 million in construction was completed in 1957. This consisted of about 7,700 ft of heavy duty runway that will extend a total of 11,440 ft; 4,000 ft of taxiway and warm-up pads; six dormitories; dining hall; service clubs; fire station facilities; bulk storage tank and fueling utilities. In readiness to start in 1958 is some $12 million worth of construction.

• **Lawrence G. Hanscom Field (Bedford, Mass.)**—Construction completed in 1957 consisted of maintenance shops and buildings for some $5 million. Presently under construction are a laboratory, pavements and utilities costing $1.3 million. Projects expected to be awarded early in 1958 are estimated to cost approximately $2.9 million.

• **New Hampshire Turnpike**—Some 64 miles of four-lane asphalt and divided highway has been completed and opened. The mileage is on two pikes, designed for a maximum grade of 3%, maximum turn of 3 deg and for 70 mph speeds. The roads are: SPAULDING TURNPIKE—This $12 million highway from Portsmouth to Rochester. EVERETT TURNPIKE—Built under 17 separate contracts, some 40 miles of roadway from Concord to the Massachusetts line.

• **Boston Expressways**—An extremely expensive and difficult road job, the four-mile elevated and underground Central Artery bisects the heart of Boston. Though the $100 million project was started in 1951, only about two miles is opened. Completion is expected in 1959. So complex are the construction problems that only 200 ft of a 2,400 ft tunnel is costing close to $2 million.

• **Rhode Island Freeway**—When completed, the project will link the Connecticut state line at Route 84 with the Massachusetts line at Seekonk, to the east, and North Attleboro to the north. The southernmost section—Connecticut to Nooseneck Hill Road (Route 3) in Washington County—is already finished. Under construction costing more than $14.5 million, is the Providence River bridge and The Fox Point Interchange in downtown Providence.

• **Drydock Quincy, Mass.**—To meet the demand for new oil tankers and a nuclear-powered surface vessel for the U. S. Navy, Bethlehem Steel Shipbuilding Corp., is building a drydock 900 ft long by 500 ft wide, costing $13 million. Steel dividers will make the dock, in fact, three separate facilities.

• **Boston Army Base**—The rehabilitation of the combined wharf and pier project was awarded to Merritt Chapman & Scott Corp., in May 1955 for $7.9 million. The work is now 98% complete. The main part of the work consisted of a cast-in-place concrete gravity wall with a cantilevered deck, designed by Fay, Spoffard & Thorndike of Boston. Some 140,000 cu yd were placed underwater in 61 pours by tremie method, and 40,000 cu yd were poured in the dry for the top portion and deck.

• **Connecticut Turnpike**—The entire 129 mile highway, costing $445 million, was opened to traffic January 3, 1957 with the exception of three miles at the south end. Still under construction is a section from Greenwich, Conn. to the New York state line at Port Chester. Included are two bridges, one spanning the Mianus River and the other crossing the Byram River. Featured is continuous lighting from Greenwich to New Haven.

Middle Atlantic

• **Kingston-Rhinecliff Bridge**—The 7,793 ft continuous-truss bridge, designed by D. B. Steinman, was completed and opened to traffic February 2, 1957. Costing $19 million, the Hudson River span links the New York Thruway with the Taconic State Parkway.

• **New York Thruway**—Berkshire Section—Starting at the main stem of the Thruway, 8 miles south of Albany, the 24 mile route extends across the Hudson River on a new bridge (under construction) to the Massachusetts State Line to connect with the 123-mile-long Massachusetts Turnpike. It is estimated that the cost will be $52.9 million.

The **Erie Thruway**—a 70 mile, $85 million, four-lane concrete road running from Buffalo to the Pennsylvania line, will be completed sometime in the spring of 1958. Except for a 43 mile road to be constructed across Northern Pennsylvania and a 60 mile stretch from Conneaut, Ohio, to the Warren Interchange on the Ohio Turnpike, completion of the Erie Thruway will permit non-stop travel between Chicago, Boston and New York City.

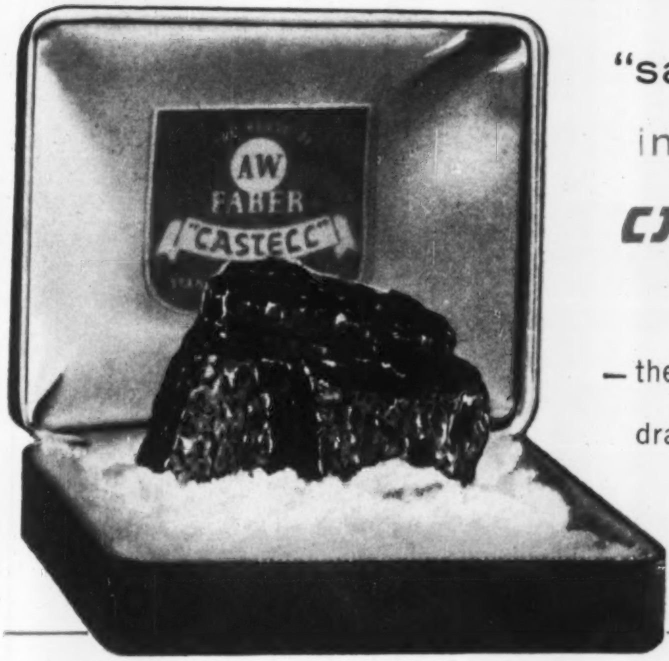
The **New England Thruway**—linking New York City with Connecticut—will reduce substantially heavy truck traffic now plaguing U. S. Route 1 and eight communities through which it runs. Of its 15 miles, four miles are 100% complete; 6.7 miles are 96% complete and 4½ miles are 55% complete.

• **New York Expressways**—Some 13 miles of the LONG ISLAND EXPRESSWAY are now under construction, extending eastward from New York City into Queens County.

Eventually the expressway will be 91 miles long, linking the Queens Midtown Tunnel via Nassau County with Riverhead, in Suffolk County, L. I. The roadway is complete from the tunnel to

"BLACK GOLD"... the best natural graphite of more than 99% carbon...

"saturates" imported **CASTELL** — the world's finest drawing pencil



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CASTELL LOCKTITE

Mined out of the earth just as any precious mineral, CASTELL **"black gold"** graphite tests out at more than 99% pure carbon.

In its virgin state it is the purest black known to man. There is no need for us to add foreign oily substances to CASTELL. Nature at her best is beyond improving. Our job is to apply almost 200 years of pencil-making experience to refine this "black gold" into 20 superb tones, 8B to 10H — each degree as uniform as a platoon of West Point cadets.

Make a series of single or multiple pass lines with your favorite CASTELL degree. Now examine them through your magnifying glass. Notice the bold, black, close-textured saturation, the identical width in line after line. You owe it to your career to use CASTELL, the drawing pencil of the Masters. Good dealers everywhere carry CASTELL. Phone *yours* today.

CASTELL LOCKTITE (with Tel-A-Grade Indicator) for those who prefer a feather-weight holder with degree indicating device. Grips the lead like the jaws of a bulldog to prevent slipping or turning. One hand push-button control reduces graphite stains.

Imported CASTELL 9030 Lead — with the identical graphite that made Castell wood pencil world famous. Usable in all standard holders, but a perfect mate with LOCKTITE. Also available in a kaleidoscope of colors. Packed in plastic tube, 12 leads each.

A.W.FABER · CASTELL
NEWARK 3, N. J.
The Proudest Name in Pencils
Castell in Canada • Write Hughes Owens Co., Ltd., Montreal

A.W.FABER CASTELL DRAWING REFILL LEAD

PREFERRED BY PROFESSIONALS IN EVERY CIVILIZED COUNTRY ON EARTH.

UNIT 1020 — a ¾ yard excavator, built for the tough jobs, yet with fewer parts than practically any machine on the market.

Step Up Truck Loads with UNIT

UNIT models are available in ⅜ to ¾ yard excavators . . . Cranes up to 30 tons capacity . . . crawler or mobile types . . . gasoline or diesel. Fully convertible to all attachments.

Here's a UNIT ¾ yard Shovel that's "in there swinging" . . . making pay loads. UNIT's balanced stability and power permit hard digging . . . produce maximum yardage at low operating cost. Fewer working parts cut down replacements required . . . reduce maintenance costs. The FULL VISION CAB enables operator to see in ALL directions . . . promotes safety . . . increases efficiency. Results in more loads per day and easier load handling.
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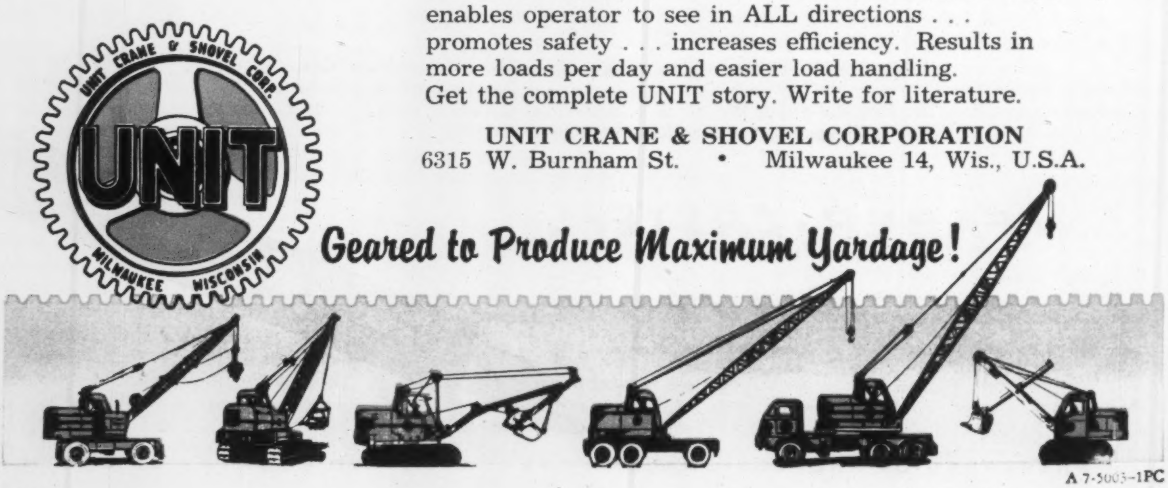
Geared to Produce Maximum Yardage!



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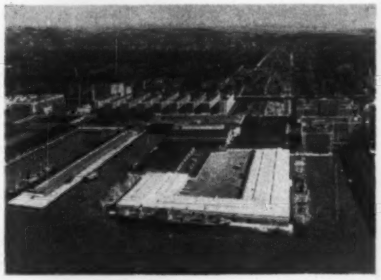


BROOKLYN PIER — $10.6 million 39th Street Terminal will be occupied by Japanese steamship company.

Flushing. The remaining section, east of the Nassau line is under design and bids will be called for early in 1958.

The first three sections of the 13 mile CROSS-WESTCHESTER EXPRESSWAY, to link the NEW ENGLAND THRUWAY at Rye, N. Y., to the NEW YORK THRUWAY at Elmsford, N. Y., is well under way. The White Plains section of the connecting expressway includes 4.2 miles of main route, and 11 miles of access road construction. A total of 22 bridge structures will be erected along this route. Contracts have not yet been let for the other two sections but the total cost will be about $30 million. The project was started in early March of 1957, is scheduled to be completed by Oct. 1, 1959.

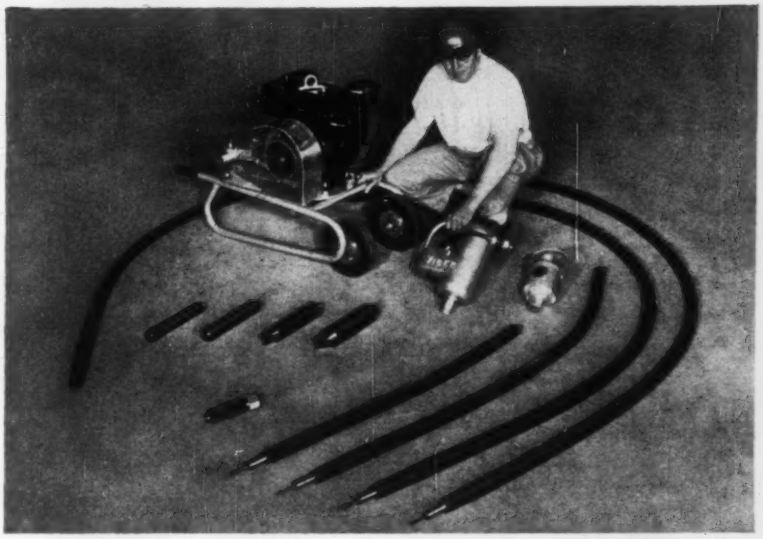
The 0.8-mile-long CROSS-BRONX EXPRESSWAY, cutting through a heavily congested city area was started in August 1956. Some 600,000 cu yd of material had to be excavated and removed, 80% of which was rock. Completion is expected late in 1958.

• **Throggs Neck Bridge**—Four contracts have been awarded for the construction of the $90 million, six lane bridge across the East River with a 1,800 ft main span and two side spans of 555 ft each. The structure will link Queens County, Long Island with the mainland in the Bronx. The bridge is scheduled to be opened in 1961.

• **Port of New York Authority**—The $100 million, mile-long underwater Lincoln Tunnel Third Tube was completed and opened to traffic May 25, 1957. At the Manhattan end of the tunnel, the $10 million, eight-block-long Lincoln Tunnel Expressway alleviates approach congestion and facilitates traffic dispersal at city streets. In August 1957 a contract was awarded to Ammann & Whitney, consulting engineers of New York City, to design a second deck for the George Washington Bridge adding six more traffic lanes. The deck addition plus improved and additional approaches will cost about $167 million.

An $85 million development is

How Viber Answers All Your Problems on Concrete Vibration



You reduce your capital investment—reduce your day-to-day operating and maintenance costs—and answer *all* your vibrating problems—by standardizing on Viber vibrating equipment.

You discover that the Viber line is the most complete line available—and that Viber internal vibrators driven by flexible shaft are the most versatile. With just 12 basic components, as shown in the photo, your men quickly and easily assemble any one of 48 shaft-driven vibrator combinations.

You use electric, pneumatic or gasoline power—whichever is most convenient for the particular job.

You have a 1¾" diameter vibrator head to assure efficient compaction in narrow forms, or where reinforcing steel is closely spaced. You also have larger, interchangeable heads (2⅛", 2½" and 3" diameter), which are recommended for maximum efficiencies in more open forms.

You have a choice of flexible drive shafts in these lengths: four, six, 12 and 21 feet. Because all shafts are immediately interchangeable with any required Viber head and motive power, you can immediately adapt to a wide range of applications in narrow to moderately open forms. Shafts can be coupled to provide longer reach.

A wide variety of other types of Viber vibrators are available to answer all your concrete vibration problems—with the lowest possible capital investment and least possible operating costs.

For factual information, illustrated literature and the name of your nearest distributor, write Viber Company, 726 South Flower St., Burbank 11, California.

VIBER CO

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Pioneers and leaders in the manufacture of vibrators.

An Economical New Fastening System For Asbestos Sheets

The economical new Townsend Tuff Tite fastening system for asbestos produces waterproof joints without expensive, time-consuming caulking, whether you prefer tapping screws or bolts. Weatherproofing and vibration resistance are provided by the conical neoprene washer, which completely fills the hole. Fastener and neoprene washer arrive on the job pre-assembled and ready to install.

If you are fastening corrugated asbestos or sandwich board, you can effect important economies with Townsend Tuff Tites. Write for full information. Townsend Company, P. O. Box 237-L, New Brighton, Pennsylvania.

Undercut in washer-head controls flow
Conical shape is secret of good flow

The Fastening Authority

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Sales Offices in Principal Cities

Cherry Rivet Division • Santa Ana, California

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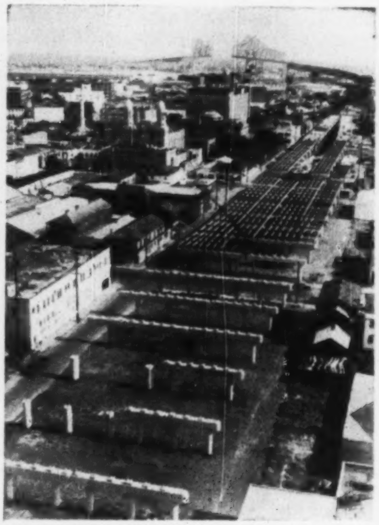

NEW ORLEANS BRIDGE – Approach steel cuts through downtown section to reach Mississippi span.

abuilding along two miles of Brooklyn's waterfront. Work includes construction of 10 new piers, the rehabilitation of an existing pier, and the improvement of 50 acres of upland area. The project started in July, 1956, and will be built over a 7-year period, to assure the least possible degree of disruption to operations of occupants of the existing facilities.

At Port Newark, four new cargo distribution buildings, to cost about $4.4 million will be built on the south side of the channel. Work was started in the spring of 1957.

LaGuardia Airport's badly outmoded and overcrowded passenger facilities are to be rebuilt at a cost of $32 million. First phase of the new project, to be completed by 1960, will add parking space for 3,000 cars. Two wings will be added to the terminal building. By 1965, the terminal's central structure will be demolished and replaced.

• **New York City Port Work**—A new, square-shaped cargo and passenger terminal costing more than $18.7 million will be built at the foot of West Houston Street, North River, Manhattan, to be occupied by the Holland-America Line. Bids for the construction contracts will close June 30, 1958. Clearing of the site has started and it is estimated that construction will be completed sometime in 1960-61. The City will start construction in mid-1958 on a new $10.6 million shipping terminal in Brooklyn. Extending along the shore from 36th St. to 39th St., the terminal will be 700 ft wide, extend 1,060 ft into Gowanus Bay and have 13 acres of cargo-handling space. Four berths for ships will also be provided.

TERRATRAC
CERTIFIED
OWNER
REPORT

"Our new TILT-CROWN DOZER does a day's work in 2 hours!"

Joseph Artino, Shaker Heights, Ohio, excavating and grading contractor, is really sold on the performance of his 80 HP Case® TerraTrac® Tilt-Crown dozer. The day these pictures were taken, he finished leveling and backfilling around three large homes in just *two hours.* "That same job," according to Artino, "would have taken us *all day,* and we'd have worked a lot harder, with the competitive-make dozer we previously owned."

No clutching . . . No shifting!

"We find the TerraTrac '800' much faster and easier to operate than other crawlers," Artino reports. "There are no steering clutches to fight, and you don't waste time shifting gears. With the counter-rotating Terramatic transmission I can *shift on-the-go . . . turn on a dime . . .* merely by flipping a couple of hydraulic levers. Back-up time is cut in half because reverse speeds are twice as fast as other crawlers."

Likes power-tilting blade

Artino says the power-tilting blade feature is a big time-saver for ditching, root-cutting and terracing work. "By tilting blade from seat, *I can start cutting on the first pass,* instead of making 3 or 4 dry runs to get started," he comments. "I can also make a counter-rotating turn at end of each pass . . . tilt the blade to the other side while I'm turning around . . . and thus *keep moving dirt in both directions,* instead of backing up with an empty blade. Result — I can do twice as much work."

You, too, can increase your production with a Case TerraTrac "800" Tilt-Crown dozer. See it today at your Case Industrial Dealer's, or mail coupon for details on other bulldozer sizes suited to your needs.

Up to 20,000 lbs. push enables the rugged 80 HP Case TerraTrac Tilt-Crown dozer to root-out big rocks, stumps, etc., in a hurry. Power is delivered smoothly and evenly by the torque-converter drive, which also cushions the power-train against jolting shock loads.

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Just sprinkle on the leveled and floated fresh concrete surface, then work into the surface with a wood float and finish with a steel trowel. You'll be amazed at the brilliance and depth of the two beautiful colors: Tile Red and Spanish Green.

Remember . . . ART-ROC is not just a surface film, but color that's built-in to stay . . and it's so easy to use!

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INTERSECTION—U. S. 40 meets local roads near Weiman, Calif.

Completion is scheduled for late 1959.

• **Arthur Kill Bridge**—The longest lift span bridge in the world is being constructed for the Baltimore & Ohio Railroad, between Elizabeth, New Jersey and Arlington, Staten Island, to replace a 70-year-old railroad swing span. Because of unexpected difficulty encountered in concreting a foundation section, completion of the project as originally planned will not be possible.

• **Philadelphia projects**—A 17 year, jet age expansion program is under way at International Airport to handle an estimated 6 million passengers annually by 1975. Finishing touches are now being put to a jet runway. Completed is the installation of a taxiway guidance lighting system for night operations, as well as the initial stages of the $5 million parallel instrument runway for the use of jets.

A $4.2 million, 5.6 mile extension of Henry Ave. is scheduled to be opened to traffic in mid-January, 1958. The new highway will connect with the Roosevelt Blvd. extension now under construction between Broad St. and the Schuylkill Expressway.

Walt Whitman Bridge, spanning the Delaware River, between Philadelphia and Gloucester, N. J., was opened to traffic in May, 1957. The $90 million bridge and its complex approaches—6.5 miles—had been under construction by the Delaware River Port Authority for nearly four years.

The Delaware Expressway will remove the last road block on a limited access highway to provide a high speed traffic artery linking the Walt Whitman Bridge across the Delaware River with the Pennsylvania Turnpike near Bristol. Work got under way late in 1957.

• **Pennsylvania Turnpike Extension**—Northeastern Extension was completed with the opening of the final 15 mile section on November 7, 1957. The new extension completes the link with Scranton at the Scranton Interchange.

• **Pittsburgh's Road Projects**—A $150 million program to break Pittsburgh's traffic bottleneck, is under construction. The following projects make up the program:

A 2½ mile downtown interchange on the Monongahela side of the city's business triangle;

A high-speed interchange at Etna, on the north bank of the Allegheny River;

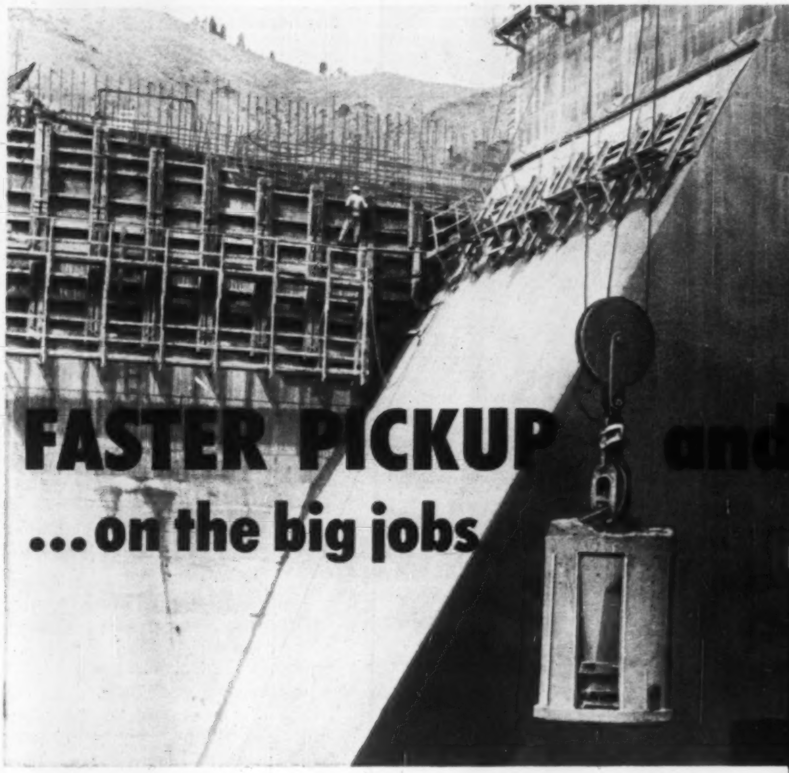
A $17 million tunnel under Mt. Washington opposite the famed "Golden Triangle";

A new $16 million Fort Pitt Bridge across the Monongahela River to replace the Point Bridge and connect to the new Mt. Washington Tunnel;

A crosstown boulevard;

A complex interchange at the tip of the Triangle, to carry traffic to and from the new Fort Pitt Bridge, major highways on both sides of the Triangle and to a proposed new bridge across the Allegheny River.

Fort Pitt Tunnel—3,430-ft-long twin-tube rock tunnel costing $10.6 million,



Gar-Bro Concrete Bucket is lowered to dumping position. Note: Crane Hook is absolutely safe; cannot open under load.

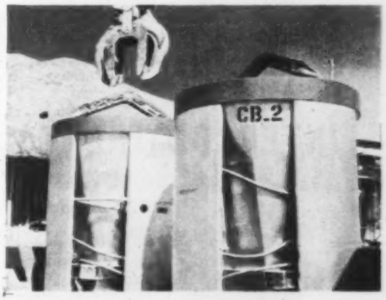
GAR-BRO BUCKETS AND AUTOMATIC CRANE HOOKS PLACE MORE CONCRETE

NEW SPEED RECORDS are being set by a new combination of Gar-Bro equipment for handling mass concrete.

On many large projects Gar-Bro Concrete Buckets are being used with Gar-Bro's new power operated Crane Hooks. This combination delivers more concrete faster because it eliminates all the mechanical difficulties usually a part of large bucket operation.

Model A Gar-Bro Concrete Buckets have air controlled gates which are opened or closed by hook-on or pull chain operation. The new Gar-Bro Crane Hook which is trigger actuated gives the crane operator complete control. He can pick up a loaded bucket or set down the empty bucket and release it at will. There are no delays... no hook on problems, he merely picks up a loaded bucket and hoists it to dumping position where the concrete is dumped by means of a pull chain. The bucket is returned to loading position, released and another bucket is picked up.

This method of concrete handling obviously allows a manpower economy and eliminates the hazards and delays of a "hook on" man. All in all the combination of Gar-Bro Crane Hooks and Concrete Buckets increases the number of passes by the crane.



Here the Gar-Bro Crane Hook is being lowered to pick up bucket. When trigger mechanism on the hook contacts the bail, the hook closes.

GAR-BRO MANUFACTURING CO.
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General Offices:
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For more information write for catalog. Are you receiving your free copies of "Concrete News"? This periodical published by Gar-Bro is filled with job reports of all types and will be sent to you regularly upon request.

Four Gar-Bro Buckets are transported from the mixer to the pour on this truck-trailer.

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LONG BRIDGE – Richmond-San Rafael stretches across arm of San Francisco Bay.

is being bored from one side only because of local geography. Completion is expected for the end of 1959.

- **Baltimore Port**–The new $4 million fruit pier construction for the Baltimore and Ohio Railroad got going in April, 1957, south of Locust Point. The one-story steel and concrete structure will permit simultaneous undercover loading of 63 railroad cars within the pier.

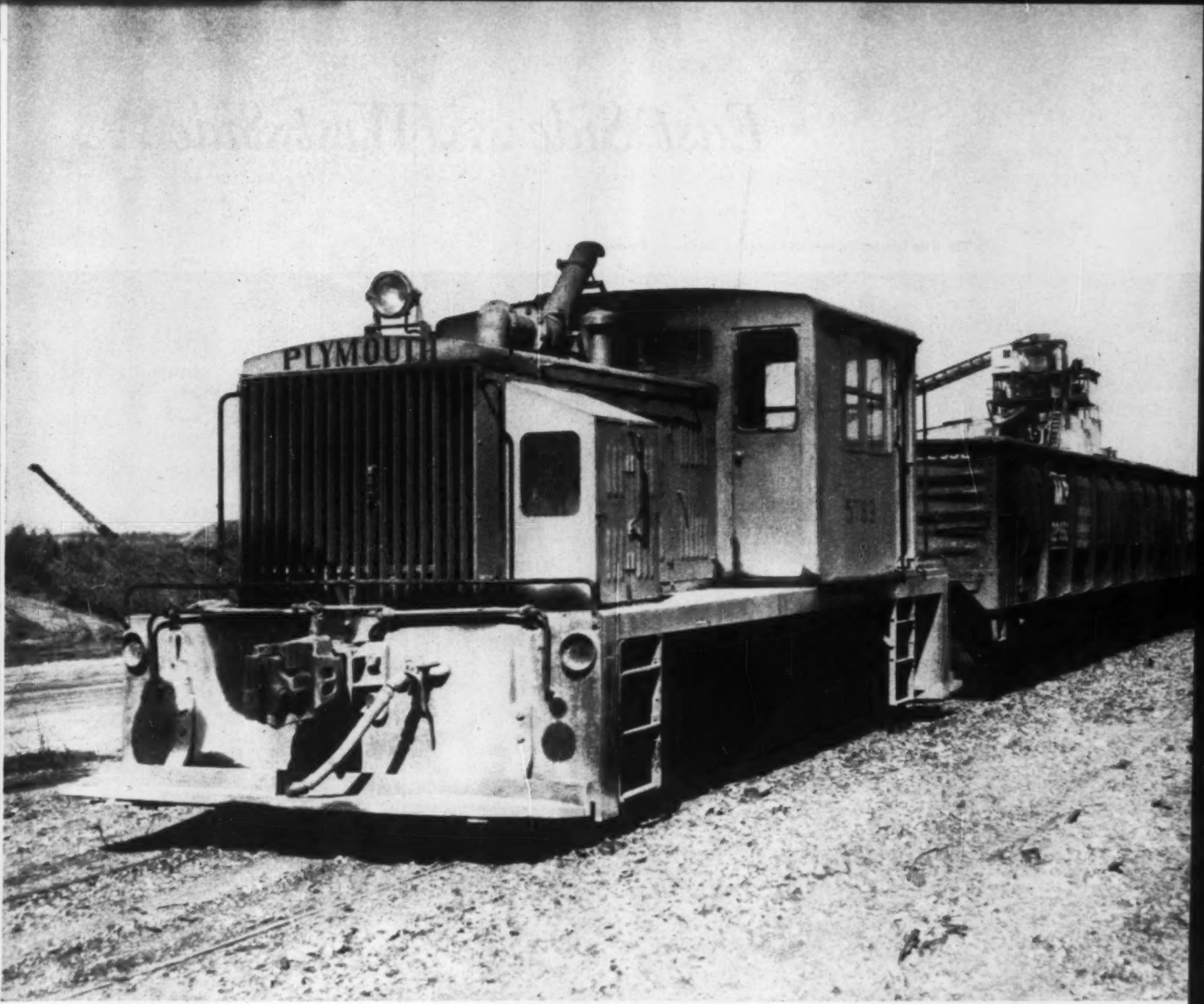
- **Patapsco Tunnel**–Opened to traffic on November 30, was the 7,650 ft tunnel, consisting of 21 twin-tube sections, which had been floated out and sunk into place. Completed also were 16 miles of approach roads and structures including an unusual K-truss bridge over a railroad yard near the tunnel's south entrance.

- **Texas Tower**–Third of the five offshore radar warning stations planned for the east coast was erected in the Atlantic Ocean, 60 miles southeast of Sandy Hook and 100 miles east of New York City. The operation was roughly equivalent to floating a 30 story steel skyscraper on its side, then tipping it to exact position in more than 180 ft of water. The work was done in 24 hours, July 6-7, 1957.

South

- **Richmond-Petersburg Turnpike**–Divided into 17 contracts this $70 million Virginia highway was designed as a toll road, but approved as part of the toll-free interstate highway system. Some 12 of its 35 miles are in the heart of Richmond and four are in Petersburg. Target date for opening is April 1, 1958.

(*Continued on page 180*)



40-Ton Plymouth switches over 15,000 gondola cars per year—moves some as many as 6 times per job

Plymouth saves money from the first day

...in rugged sand and gravel loading operation

"One of the best pieces of equipment we've ever purchased," is the way Sam R. Clark, Manager of Malvern Gravel Company, Malvern, Arkansas, describes the company's 40-ton diesel-powered Plymouth Locomotive equipped with Torqomotive (hydraulic torque-converter) Drive.

"Replacing steam-powered equipment in loading sand and gravel," reports Mr. Clark, "our Plymouth Diesel has done the work of two engines—handling over 15,000 railway cars a year over a 5-mile standard-gauge track. Many jobs require multiple switching and we can easily move 50 empties and up to 40 cars loaded. Operating about 50 hours a week, our Plymouth performs faster and smoother than either steam or electric-powered equipment."

"Saved money from the first day of operation," says this user.

Plymouth shown above delivers outstanding performance, unusual economy in switching, spotting and hauling.

Plymouth gasoline and Diesel Locomotives, from 3 to 80 tons, can increase production and reduce your operating costs.

Send us a brief outline of your operation; we'll send you a recommendation promptly. Address: Plymouth Locomotive Works, The Fate-Root-Heath Company, Department A4, Plymouth, Ohio.

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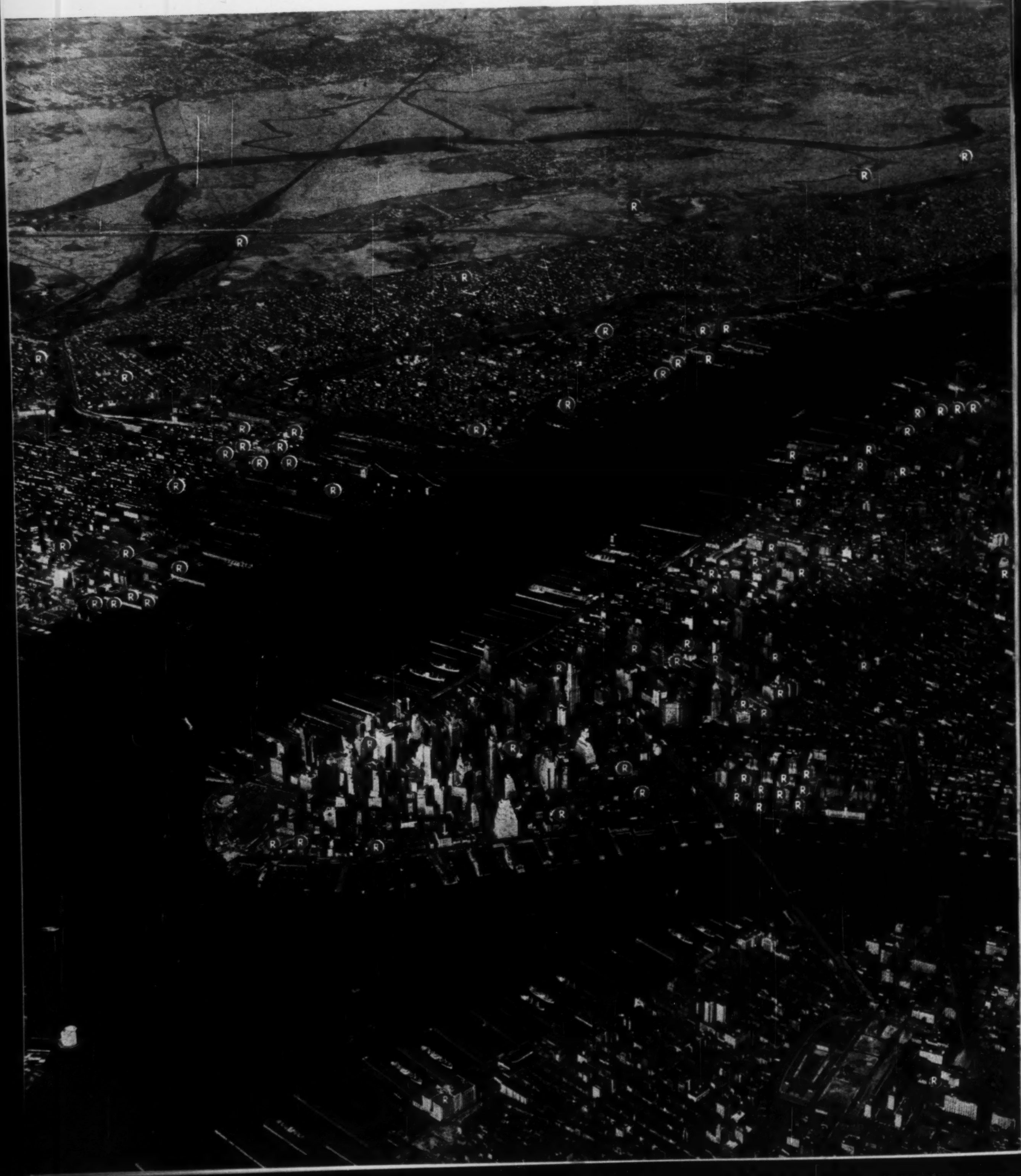
The dots indicate structures built on Raymond Foundations



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As you can see, Raymond has been pretty active in the New York metropolitan area during the past half century. In that time we have installed foundations for structures of nearly every size and description . . . big, medium, small, we enjoy working on them all. Examples are the New Jersey Turnpike Overpasses, installations along the Hudson River, and at Brooklyn Navy Yard, as well as over 40 apartment projects housing 1/12 of New York's population.

While not shown in the picture, hangars at La Guardia Airport, sections of the Major Deegan Expressway and the Bulova Watch Plant also testify to our wide and diversified experience. So does a Raymond-supported handball court at Coney Island, for that matter.

For over 60 years Raymond has completed a variety of contracts in cities and towns across the country. All of this proves that no project is too large or too small for our attention. May we serve you, too?

You are cordially invited to send for our new Highway Brochure, which gives a detailed resume of how Raymond can help you and the National Highway Program. Just write Dept. E-2, Raymond Concrete Pile Co., 140 Cedar Street, New York 6, N. Y.

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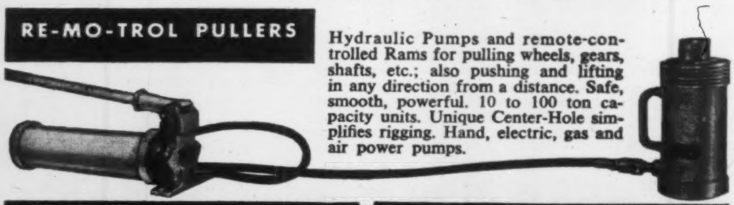

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• **Hampton Roads Bridge-Tunnel**—The world's sixth longest subaqueous crossing was opened November 1, 1957. The tunnel is a key section in the Virginia highway system, connecting Norfolk and Old Point Comfort.

• **Florida Turnpike**—The Turnpike Authority opened the 108 mile, $75 million Sunshine State Parkway from Miami to Ft. Pierce on January 26, 1957.

• **Harvey Canal Tunnel**—The first four lane, vehicular tunnel passing under New Orlean's Harvey Canal was put into service September 5, 1957. It took three years to build at a cost of $4.5 million. The tube is 65 ft wide, 21 ft high and 1,080 ft long.

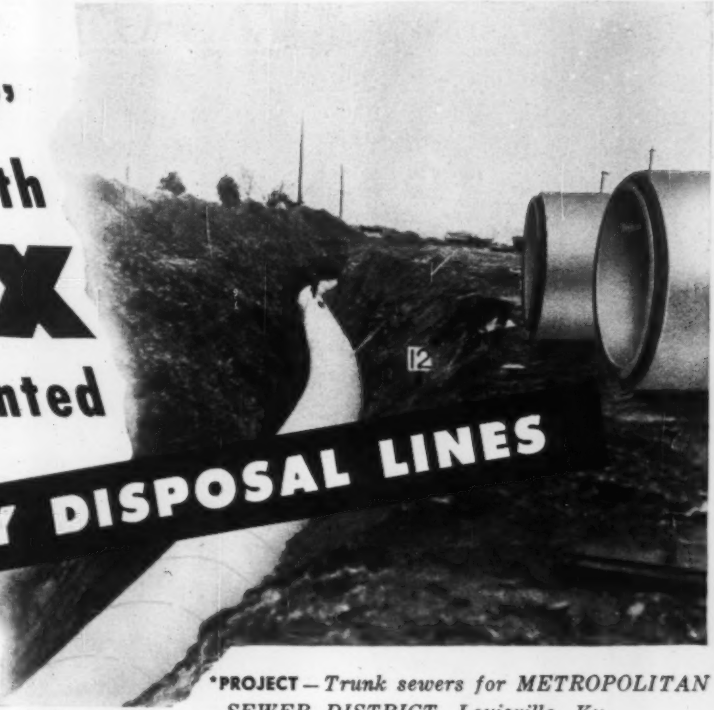
• **Mississippi River Bridge**—The 3,020 ft cantilever bridge over the Mississippi River at New Orleans is scheduled to be opened to traffic in March of this year. The 2.3 mile tool bridge project was financed by a $65 million bond issue. The final chord section of the 1,575 central span was hoisted into place on January 3 of this year, less than three years after groundbreaking on Mar. 25, 1955.

Middle West

Illinois Toll Roads—The 187 mile Illinois toll highway system was slightly ahead of schedule as to grading, paving and bridge construction, at the end of 1957. The first section, from O'Hare airport northwest of Chicago to the Illinois-Wisconsin line at South Beloit, will be opened to traffic this summer, and the entire system opened to traffic by the end of this year. At year's end, grading operations, which will total 73 million cu yd for the entire project, were 75% complete. Nearly 60 miles of four-lane pavement had been constructed. Substructures had been completed for 104 of the 265 bridges in the project, roadway beams had been placed on 53 bridges and the decks on 26.

• **Chicago projects**—Seven contracts totaling $5 million were awarded by Cook County (Ill.) for construction of **Congress Street Expressway** last year, the largest of which was a $1.8 million railroad grade separation structure. This year the county expects to award 14 contracts totaling about $6.8 million for grading and paving; railroad grade separations; mass transit river bridge and other facilities; landscaping and lighting. The 1959 construction program includes about $1.3 million worth of contracts to be awarded chiefly for grading and paving. About 9 miles of the $106 million expressway are now

Louisville* "Plays Safe" with TYLOX Jointed



SANITARY DISPOSAL LINES

*PROJECT—*Trunk sewers for METROPOLITAN SEWER DISTRICT, Louisville, Ky.*

ENGINEER—*Morris Forman, Chief Engineer*

PIPE—*Over 31,000 feet of 60" and 70" reinforced concrete pipe manufactured by Kentucky Concrete Pipe Company, Frankfort, Ky.*

CONTRACTORS—*Ruby Construction Company, Inc., and W. L. Hailey and Company, Inc., Louisville, Ky.*

When engineers and sanitary officials of the Louisville and Jefferson County Metropolitan Sewer District specified TYLOX RUBBER JOINTS for new trunk sewers, they "played safe" on three factors that mean a lot in protecting public funds invested in waste disposal projects. Their TYLOX decision automatically assured:—

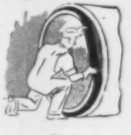
No Infiltration — Passage of water **in or out** of the pipe joint is prevented by "compression-tight" Tylox Rubber Gaskets. Tylox Joints help reduce costs of sewage treatment.

No Joint Failures — The rubber of Tylox is specifically compounded to defeat sewerage and industrial waste corrosives. Under ground, and under compression, Tylox outlasts the pipe itself. Tylox helps reduce maintenance costs.

No Installation Delays — Flexible Tylox compensates for pipe angularities in any plane . . . permits wet-trench jointing and immediate backfilling. Tylox helps cut construction costs . . . keeps jobs ahead of schedule with **more pipe laid per day.**

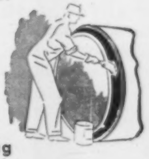
TYLOX is the **one** Pipe Joint which fully meets requirements of engineers, sanitary officials and construction men alike.

MAKING JOINTS WITH TYLOX RUBBER GASKETS IS AS SIMPLE AS



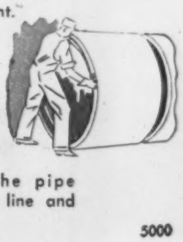
A

Cement tongue and snap on TYLOX gasket.



B

Lubricate sliding surfaces with TYLOX cement.



C

Shove the pipe home to line and grade.

Specify TYLOX RUBBER JOINTS and play safe on your next pipe job. Write for full information and more TYLOX case histories TODAY.

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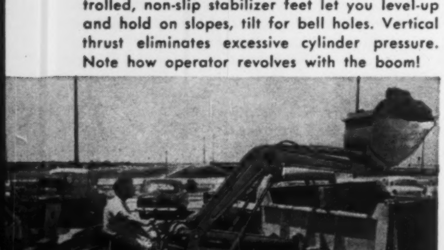
VERTICAL STABILIZERS—Individually controlled, non-slip stabilizer feet let you level-up and hold on slopes, tilt for bell holes. Vertical thrust eliminates excessive cylinder pressure. Note how operator revolves with the boom!



A Davis Loader and Backhoe combination will put money in your pocket by outperforming any other rig — pound for pound, dollar for dollar.

Eliminate those long and costly hours of backbreaking hand labor associated with jobs that require flush digging alongside buildings, fences, hedges, and other obstructions!

Davis is the only backhoe that can do all these jobs . . . and it does them quickly, easily, and profitably. In addition, Davis has a 200° continuous working arc.

You can operate Davis in places inaccessible to other machines . . . or you can set up and be finished before other machines can maneuver into position. You can dump close to the hole for quick refilling, or wide of the hole for easy accessibility . . . even direct-load into a truck.

Davis has unobstructed visibility so you can work fast and accurately in tight situations without having to "feel" your way around the job, nor depend upon shouts and hand signals for instructions. Both the big comfortable seat and finger-tip controls swing with the boom. You *always* face your work!

Advanced engineering and top quality construction? ***Yes!, but you will find them priced competitively low!***

Davis Loaders and Backhoes are available for all popular models of International, Ford, Fordson Major, Ferguson, Case, Massey-Harris, Allis-Chalmers, Oliver, John Deere, Minneapolis-Moline, and Work Bull Tractors.

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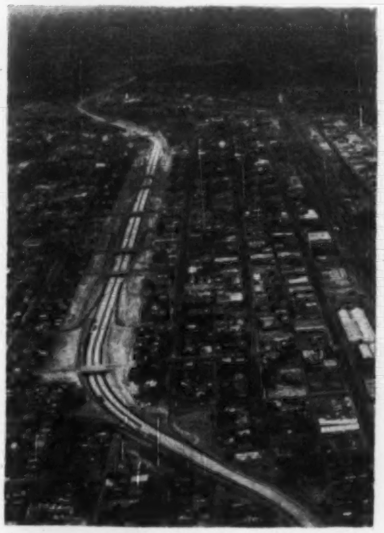


EXPRESSWAY—Detroit's John C. Lodge Expressway cuts wide swath through city's residential area.

open to traffic, from Grant Park west to Laramie Ave., and from First Ave. to Mannheim Road on the west side of Chicago.

Construction of the 8 mile $88 million Calumet Skyway Toll Bridge project—connecting the Indiana tollroad with State St. at 63rd St.—was advanced to 80% completion last year. It is scheduled for opening to traffic this spring. About $15 million worth of contracts were awarded last year leaving only a few minor contracts, such as right-of-way fencing, to be awarded this year.

Chicago expects to award about $12.5 million this year for construction of new bridges and modernization of existing ones. The program includes a new $5 million bascule bridge to carry Dearborn St. over the Chicago River. Other projects include $2 million worth of additional construction on the South Damen Ave. viaduct, from 37th to 43rd St.; and contracts for construction of a temporary bridge and the substructure and superstructure of the new Harrison St. bascule bridge. Last year city forces completely rehabilitated, at a cost of $900,000, the 37-year-old double-deck, double-leaf trunnion bascule bridge, which carries Michigan Ave. over the Chicago River.

• **Cleveland Bridges**—Completion of the joint bridge reconstruction program of the Corps of Engineers and railroad companies involving structures over the Cuyahoga River in Cleveland, Ohio is scheduled for this year. Two major structures completed early last year are a 250 vertical lift bridge for the New York Central-Pennsylvania Railroads at

TRU-LAY *flexible* PUSH-PULLS FOR
Remote Control Jobs
on a great variety of
Construction Equipment

Adaptability to all sorts of mechanical situations explains, in large measure, the wide-spread use of TRU-LAY PUSH-PULLS on tractors and their accessories, power shovels, winches, road graders, road oilers, dump trucks, snow plows, engine-driven pumps, rock crushers and other construction equipment.

These dependable Push-Pulls are used for the remote control of hydraulic and air valves, brakes, clutches, transmissions, throttles, chokes, governors, power take-offs, and many other applications.

TRU-LAY PUSH-PULLS are precision products, not gadgets. They provide positive remote-action whether anchorages are fixed or movable . . . for light loads or loads up to 1,000 lbs. . . . and they are effective over short or long distances, up to 150 feet or more.

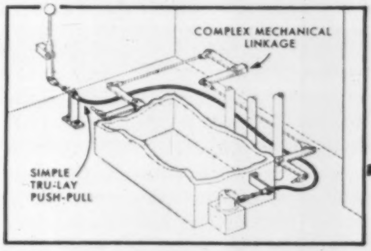
TRU-LAY PUSH-PULLS are dependable and accurate even under the most adverse conditions

They perform effectively under extremes of heat or cold . . . from jet engine temperatures to 70° below zero F. The inner, working member (lubricated for life during assembly) is fully protected by the tough, flexible conduit. Abrasive dusts, dirt and moisture are sealed out. Fittings are cold-swaged to make them integral parts of the control unit. It is a matter of record that we have never heard of a TRU-LAY *flexible* PUSH-PULL wearing out in normal service. Use of these versatile, simple and rugged controls increases ease of operation and means the virtual elimination of maintenance.

Advantages of Tru-Lay Push-Pull flexibility and simplicity are pictured below

Simplicity vs Complexity

Compare the TRU-LAY PUSH-PULL cable in illustration with the mechanical linkage. PUSH-PULLS are simple, have but one moving part, are noiseless and give lifetime service accuracy. Linkages are complex, made of many parts; they wear at many points. Their use brings increased backlash, lost accuracy and vibration rattles.



"Solid as a rod but flexible as a wire rope" is a good description of TRU-LAY PUSH-PULL REMOTE CONTROLS. This flexibility makes it possible to snake around obstructions . . . permits the ideal arrangement of all control elements . . . greatly simplifies installation of controls by reducing the number of working parts . . . damps out noise and vibration. Versatile, accurate, adaptable, rugged . . . they are the ideal remote controls for construction equipment.

Our DATA FILE will answer your further questions
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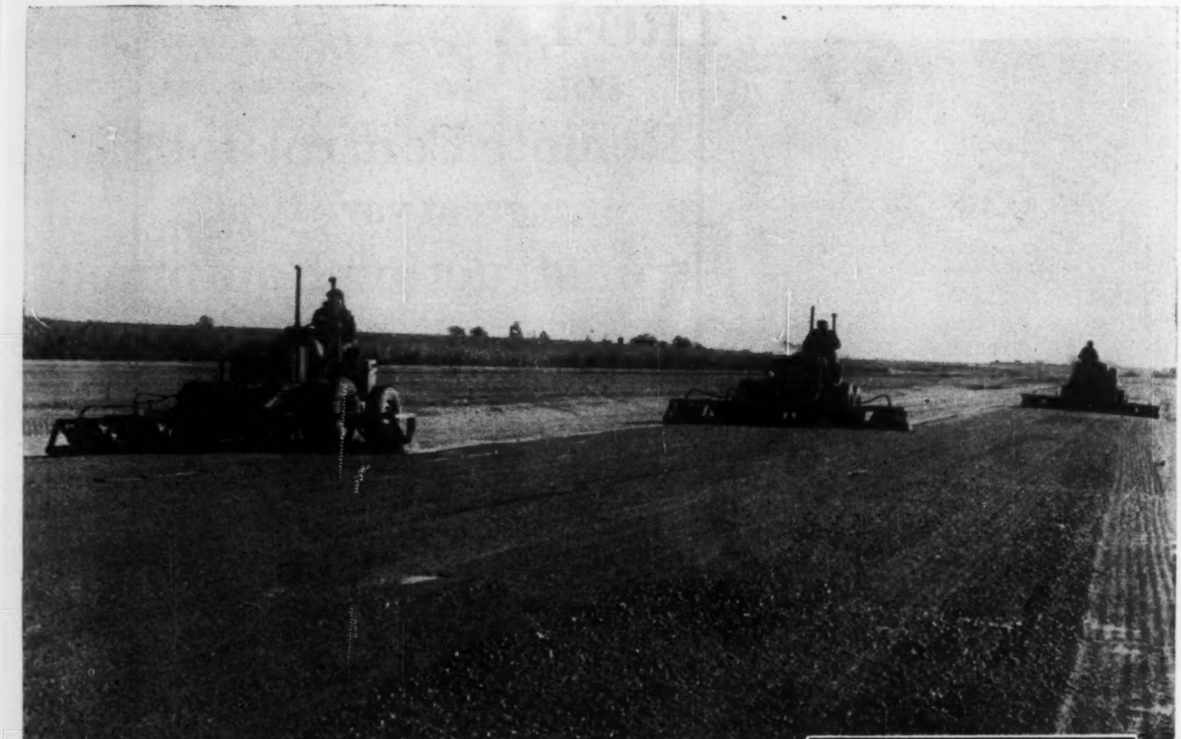

JACKSON COMPACTORS

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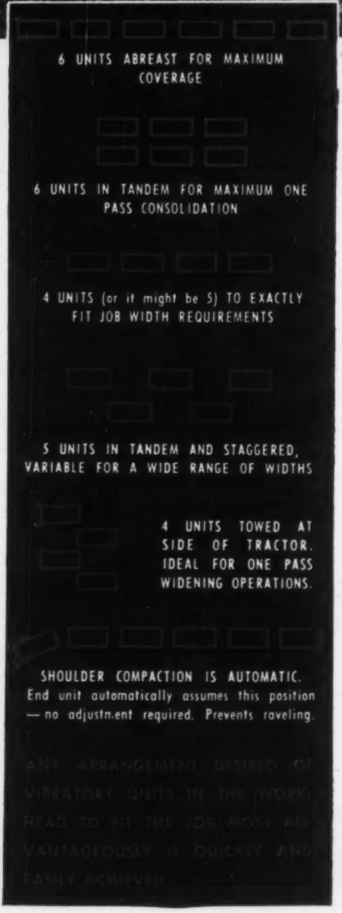

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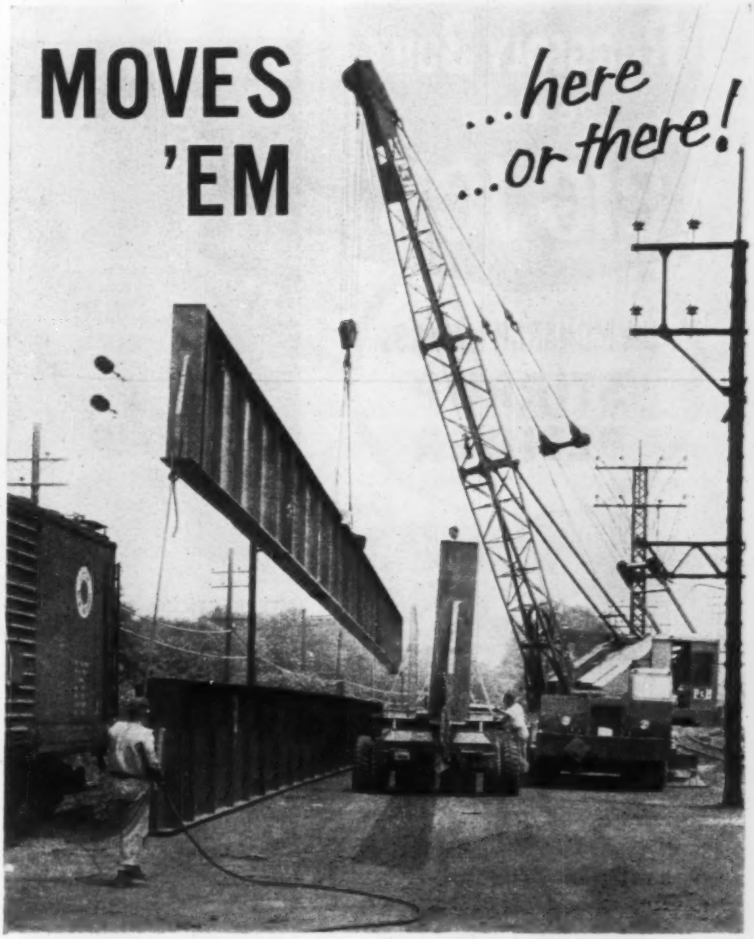
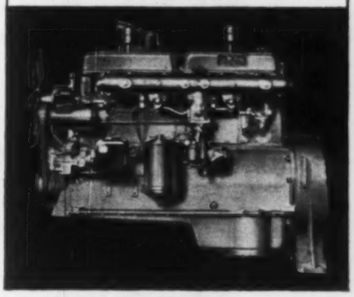
FREEWAY—Construction goes ahead on San Diego's freeway near Sepulveda Blvd.

the mouth of the river, and a $3.2 million, 255 ft bascule span for the Baltimore and Ohio Railroad. Also completed last year is a 267-ft-span vertical lift bridge for the Nickel Plate Railroad. Currently under way and scheduled to be finished this year is an Army Engineers contract for deepening and widening the lower 4 miles of the Cuyahoga River to provide a channel 23 ft deep and 200 ft wide.

• **Ohio Expressways**—Both rural expressway and urban freeway construction made substantial gains in Ohio last year. The state highway department completed three urban freeways during 1957, two in Toledo and one in Akron, totaling 4.4 miles and costing $7.1 million. During the same period 48 miles of rural expressways were completed at a total contract price of $26.4 million. Last year $42 million worth of contracts were awarded for 11 miles of urban freeway construction in Columbus, Toledo, Dayton, Canton, Cincinnati and Cleveland. At the end of 1957 a total of 49 miles of urban freeways and expressways were completed or under construction in those six cities and Akron. Ultimately this total will be increased to 74 miles.

• **Detroit Expressways**—The $90 million north-south John C. Lodge Expressway is 91% finished and scheduled to be completed by November 1959. Eight miles of the expressway are now in service and an additional 0.4 mile will be opened to traffic this year. Last year





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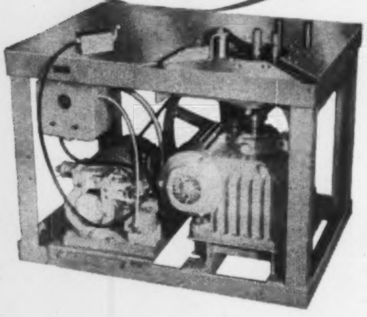

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INTERSECTION—Meeting Sunset Blvd. at the campus of U.C.L.A. (background) San Diego's freeway looks clean and wide.

$2.5 million worth of contracts were awarded and $4.5 million worth of construction was completed.

The 13 mile long east-west EDSEL FORD Expressway is 85% complete. About 7.5 miles of the expressway are now in use; 3 miles will be opened to traffic this year and the remainder in 1959. Last year the Michigan State Highway Department awarded $8.9 million worth of contracts on the expressway and expect to let about $18 million worth of contracts this year. This means that all work on the expressway will be under contract by the end of 1958. Last year 1.4 miles of the expressway were completed at a cost of $11 million. When it is finally completed, the Ford Expressway will have 71 grade separations and 24 pedestrian overpasses.

• **Mackinac Bridge**—Four-lane toll bridge across the Straits of Mackinac was opened to traffic Nov. 1, with all construction scheduled to be completed by Sept. 1 of this year. The $100 million project includes a suspension bridge with a 3,800 ft. main span, two 1,800 ft. side spans, two 472 ft. backstay spans and two 135 ft. long concrete anchorages. In addition there are 28 deck truss approach spans totaling 9,300 ft. The 17,913-ft-long bridge was built in four construction years.

West of Mississippi

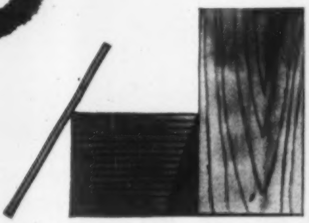
• **Corpus Christi Bridge**—By the end of 1958, the 5,820 ft long, $9 million six-lane bridge over the Corpus Christi Ship Channel will be 75% finished. A $1.3 million contract for 37 prestressed concrete girder spans and their supporting substructures (ENR, Sept. 12, 1957, p. 51) was completed last year. A second substructure contract for the two main piers and 17 concrete bents for the steel plate girder and truss spans is virtually completed at a cost of about $1.0 million. Erection of 2,000 ft of steel plate girder spans will get under way early this year under a $2.0 million contract, which is expected to be 80% finished by the end of 1958. Erection of the three-span cantilever truss unit is expected to be started in September of this year, with about $2 million worth of that $3.5 million contract finished by Jan. 1, 1959.

• **Will Rogers Turnpike**—Opened to traffic July 1, 1957, the turnpike, also known as Northeastern Turnpike, extends 88 miles from the northern corner of the Oklahoma to Tulsa, where a 20 mile link to the Turner Turnpike is under construction.

• **Tulsa Airport**—The $25 million reconstruction program for the Municipal Airport was started July 25, 1957 with a new taxiway and terminal building project. A jet maintenance depot for American Airlines will be built and the Air National Guard facilities will be expanded. Completion is expected within a year, possibly January 1, 1959.

• **Texas expressways**—The Texas State Highway Department has completed 79 miles of urban expressways in its seven

"Can't get this dad-burned sliver o' wood to burn," rumbled Paul Bunyan to Babe, the Blue Ox. A mountain top trembled and fell, damming up a river. "Babe, what the cuss do you suppose them Baxter folks done to this here piece o' plywood? ✻ She's dry—but she JEST DON'T BURN!"



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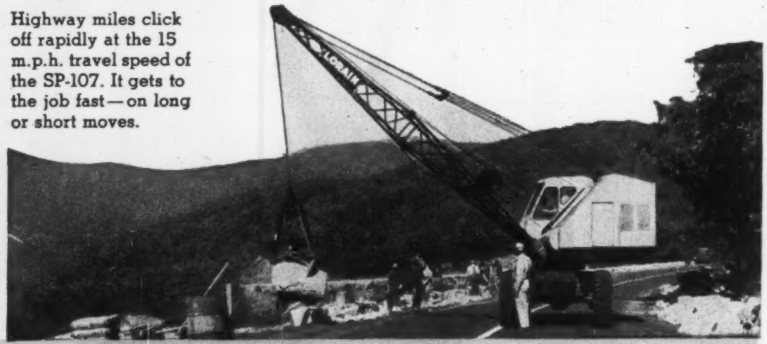

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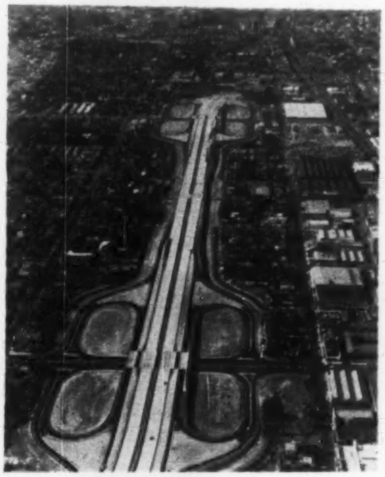

WORK TO BE DONE—Short section of California's Golden State Freeway shows unusual pattern of access roads.

major cities and Waco. This year 430 miles of rural expressways are scheduled for construction and reconstruction on the Interstate System, at a total cost of $148 million. Last year 72 contracts totaling $93 million were awarded for 320 miles of highway improvement, of which 160 miles were completed at a cost of $23 million.

Work that has been programmed by the highway commission but not yet under contract on its entire network, will cost an estimated $415 million. This includes interstate highway right-of-way and construction, farm-to-market roads, state road program, and the regular federal aid highway program.

Far West

- **Northwest Gas Distribution Lines**—Following completion in 1956 of a pipeline carrying natural gas from New Mexico to the Pacific Northwest distributing companies of the area spent some $10 million in 1957 on expansion of their systems. This work is expected to continue in 1958 but on somewhat a smaller scale, involving perhaps $7 million.

- **Alaskan Way Viaduct**—Work was carried out under two contracts totaling $4.8 million for extending Alaskan Way Viaduct in Seattle nearly a mile to the south. One contract was completed, the other is scheduled for completion by mid-1958 as is a ground-level approach. At year's end, bids were about to be called on another 3,000 ft extension involving an estimated $2.5 million.

- **Hood Canal Bridge**—A $14,226,690 contract for constructing main portion

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Falsework for triple arch bridge on U. S. Highway 99 near Dunsmuir, California is in spans of 114', 180', and 102'-5". Designed by Division of Highways, California Department of Public Works. Contractor: Charles MacCloskey Company, San Francisco.

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of a floating bridge over Hood Canal in northwest Washington state was awarded in 1957 by the Washington State Highway Commission and ratified by the State Toll Bridge Authority. Concrete pouring for the pontoons is scheduled to begin in March. Work on the piers will begin in the summer. The two lane bridge is scheduled for completion in 1960.

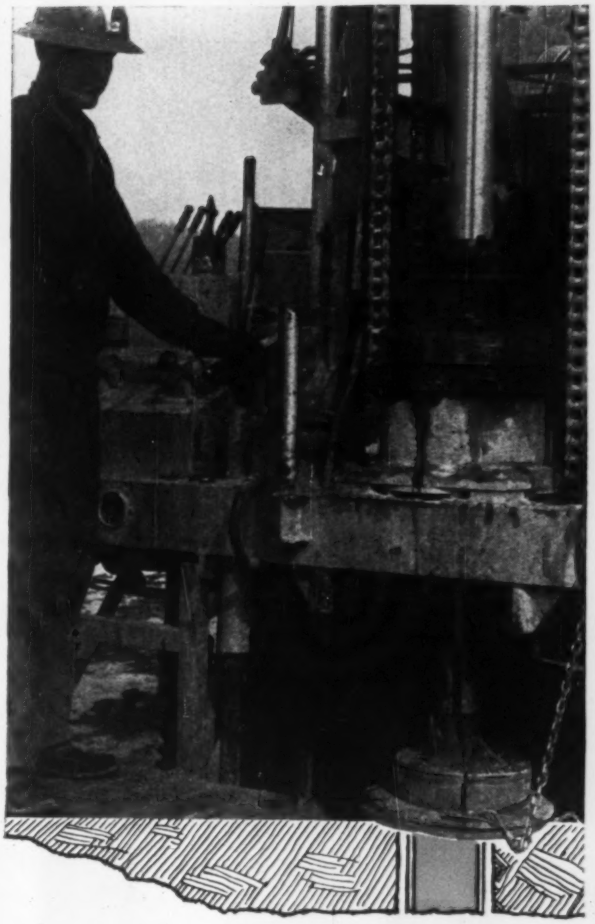
- **Tacoma-Seattle-Everett Freeway** – Contracts were awarded by the Washington State Highway Commission for first segments of the $160 million 55 mile Tacoma-Seattle-Everett freeway. Additional work is scheduled to start in 1958, including the piers for a high-level bridge over Lake Union in Seattle. The project will continue for the next six years.

- **Spokane Bridge**–American Bridge Co. has begun work on the superstructure of the Maple street bridge in Spokane. The $6 million project will span the Spokane River. Substructure work was completed recently by Morrison-Knudsen Co., Inc. The four lane toll bridge will connect the downtown district of Spokane with the northwest part of the city. Girders supported on temporary framework are being extended out from the north bank of the river to the first concrete pier.

- **Spokane Valley Freeway**–Clearing, grading, draining and surfacing was completed during 1957 on 2.2 mile section inside city of Spokane. This work also included two overpass and two underpass structures. A contract for the paving (asphaltic concrete) will be let in the spring of 1958. Completed and open to traffic during 1957 was grading, draining, surfacing and paving of a 5 mile section east of Spokane. The state highway department plans to start purchasing right of way for a 4½ mile section that will extend the freeway to the Idaho state line during 1958.

- **Columbia River Navigation**–In 1957, Corps of Engineers completed dredging the Columbia river ship channel from the ocean entrance to Vancouver, Wash., to authorized depth of 35 ft. Work was started on dredging a 27 ft channel from Vancouver to The Dalles with two 24 in. hydraulic pipeline dredges at work. The $10 million project, part of which will be by contract, will take three years.

- **Banfield Freeway**–Grading and paving of the final 2 mile portion of this 14 mile freeway bringing U.S. 30 into midtown Portland via water grade was completed in December. The $17 million project was scheduled to be opened



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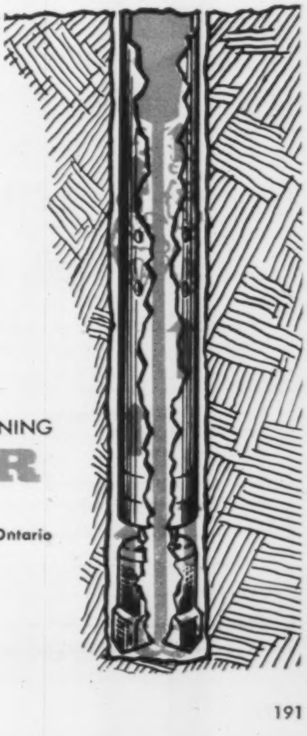

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to traffic all the way in mid-January.

• **Williamette River Bridge**—Steel erection on the $12 million Morrison street span over the Willamette River in Portland, Ore., got under way in December. West approaches are completed and east approach construction is on schedule with completion expected in March, 1958. Traffic is scheduled to move over the double-leaf bascule type span June 1, 1958. New east approaches for the adjacent Hawthorne street bridge were completed and put in use and bids were asked late in 1957 for construction of new west approaches.

• **R. H. Baldock Freeway**—Work on a $6 million extension of this $11 million Portland-to-Salem freeway section of U. S. 99 East to bring it from Portland's city limits to a midtown connection with the city's Harbor Drive and other planned freeways got under way in 1957.

• **Interstate Bridge**—Steel erection was virtually complete at year's end on a new Columbia River Interstate Bridge paralleling an existing structure completed in 1917. Project actually entails two bridges, a 1500 ft span over Oregon slough and the 3538 ft main bridge with lift span for Columbia river water traffic. Paving of concrete deck on the slough bridge was 50% complete and paving of substructure on both bridges completed. Completion of new bridges is scheduled for June 1958.

The second phase, amounting to an estimated $5.5 million, will go to contract in May 1958, and will include grading and excavation work for underground facilities. Phase three goes to contract in September 1958, and will call for an expenditure of almost $22 million. This part of the program will include construction of the ticketing buildings around the perimeter of the rectangle, the six decentralized satellite buildings, the control tower, and the main restaurant and cocktail lounge. In February 1959 the fourth and final phase goes to contract—a $7 million-plus paving and lighting job.

• **Los Angeles freeways**—Total value of the 180 miles of freeway that reached completion or were otherwise under construction in the three county area of Los Angeles, Orange and Ventura during 1957 amounted to $79.5 million. Among the 31.7 miles of freeway that were opened to traffic during the year was a 7.2 mile length of the Pacific Coast Freeway.

More than 37 miles of freeway construction contracts were awarded in 1957, the largest of which was for 6½

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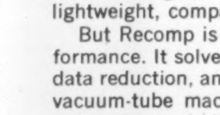

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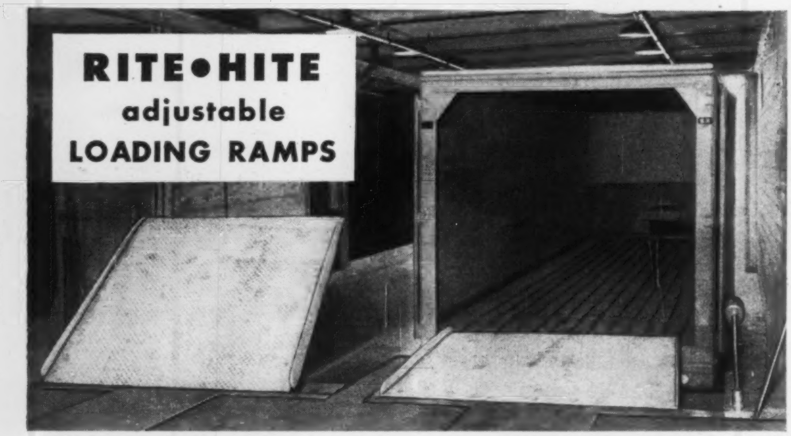

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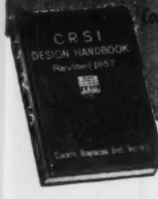

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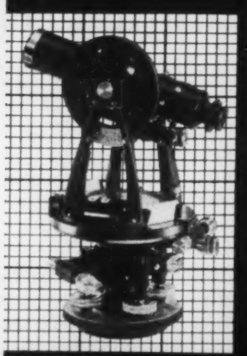

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miles in Orange County for sections of the Santa Ana, San Diego and Laguna freeways. Almost 5 miles of the Golden State Freeway were opened during the year at a cost of $10 million. The last remaining 11.8 mile unit of the Golden State was approved by the Los Angeles Board of Public Works.

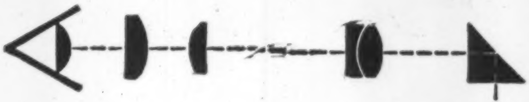
Work began on the 15 mile Santa Monica Freeway in June. Approximately 8½ miles of the San Diego Freeway is under construction at a cost of $7.5 million and work is going on in West Los Angeles on a 3.5 mile section, costing $5.7 million. The 1958-59 fiscal year budget adopted by the California Highway Commission calls for a $12.5 million expenditure for construction of 10.4 miles of the San Diego Freeway.

Almost 11 miles of the Harbor Freeway have been completed with the opening of a 4 mile length costing $22 million during 1957. An additional 2¼ mile section was reported 60% complete at the end of the year. Right of way acquisition for the final 6 miles of the 22.2 mile freeway has been completed and start of construction will depend on the availability of financing. Improvements on the Santa Ana Freeway continued and it is expected that its 42.9 miles will be completed by the end of 1958. Total cost: $76.5 million.

A 5 mile length of the Ventura Freeway was reported 50% complete at year's end. And 6.6 miles of the freeway within the city of Los Angeles is in progress at a cost of $10 million. Two separate projects totalling 8 miles have been included in the 1958-59 fiscal year budget, at a total allocation of more than $18 million. About $8 million worth of work was in various stages of progress during 1957 in extending and widening sections of the Hollywood Freeway. Eight miles of the San Bernardino Freeway were opened to traffic in 1957, bringing the completed mileage of this freeway to 30.7 at a total cost of almost $54 million.

• **Los Angeles small boat harbor**—Work on the $30 million Marina del Rey small craft harbor and recreation area for Los Angeles County got underway with groundbreaking ceremonies late in 1957. The pleasure boating and fishing harbor in Venice on Santa Monica Bay is expected to accommodate more than 9,000 land and water-based boats. The main channel, suitable for sculling regattas, will be 1,000 ft wide and 2 miles long. Basins will be 600 ft wide.

• **Port of Los Angeles**—First phase of the $101 million 15 year expansion program of the Port of Los Angeles got under way in 1957 with completion of a clear span 504x200 ft transit shed for



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Gurley OP-137

The Gurley Optical Plummet Transit (Model OP-57) has proved itself to be such an important time and money saver in the field that this optical plummet feature has also been added to the Model 132 Standard Precise Transit. The new transit will be known as the OP-137.

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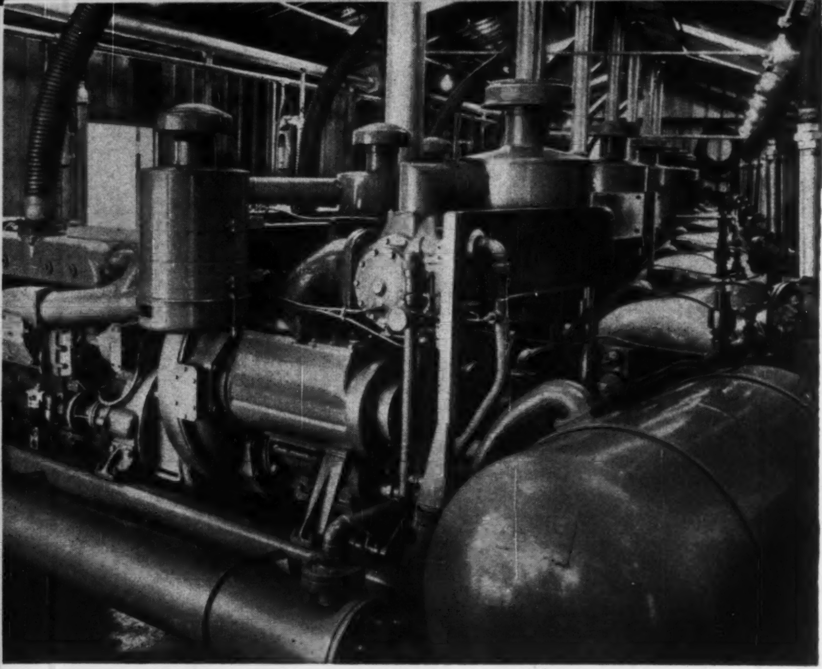
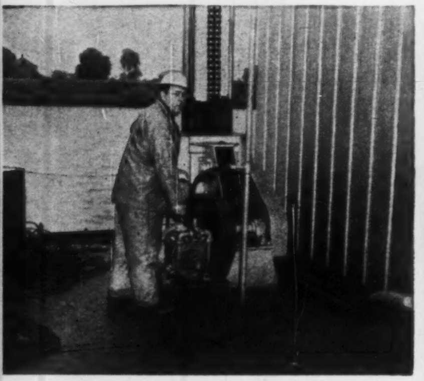
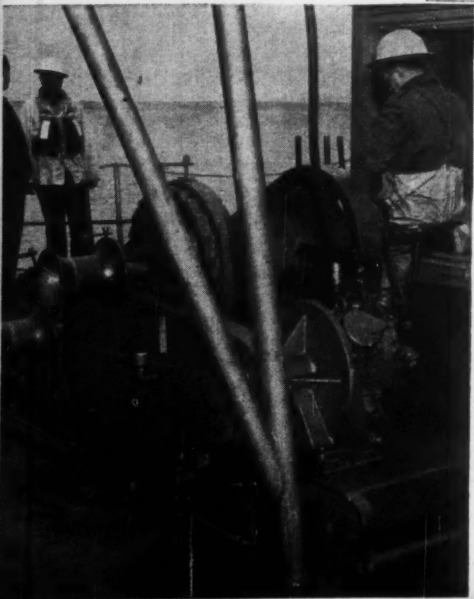


These seven 900-cfm Gyro-Flo compressors, arranged for stationary mounting, meet all air power requirements for drill barge "Hornet IV". Water-cooled heat exchangers replace the air-cooled radiators normally used for portable units. Rugged dependable Ingersoll-Rand Air Starters insure quick positive starts at all temperatures on six of these units.



Ingersoll-Rand air motors raise and lower the deck-mounted stud beams that "anchor" the "Hornet IV" firmly to the channel bottom while in drilling position.

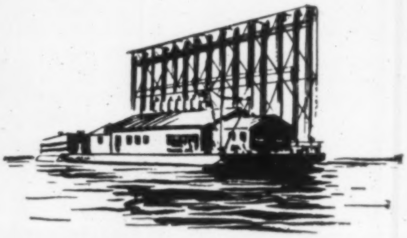


Above: The Ingersoll-Rand heavy-duty air hoists — provide the motive power on the drilling towers. Each pair of hoists is provided with a single set of centralized remote controls for easier operation.

Left: Two sets of winches, mounted on opposite ends of the barge and driven by I-R air motors, pull the "Hornet IV" to and from the drilling site between rounds by means of anchored steel cables.

GYRO-FLO *in the news*

Seven 900-cfm Units Provide ALL AIR POWER for Drill Barge "Hornet IV"



DREDGING DETROIT RIVER

Now in operation at the lower end of the Detroit River, off Amherstburg, Ontario, the special drilling barge "Hornet IV" has fired the opening rounds in a five-year program that will deepen all connecting channels on the Great Lakes. This project, undertaken by the U.S. Army Corps of Engineers, will deepen limiting channels by about 6 feet, permitting fuller cargo loadings and the use of larger vessels, with an anticipated saving of about $10 million per year in transportation costs.

GIANT DRILL BARGE

Built by Marine Operators, contractors for the Amherstburg job, the "Hornet IV" is a giant 160 ft. by 30 ft. drill barge that is blasting 6 feet of solid rock from a 6-mile stretch of channel bottom. All air power for the "Hornet IV" — for operating the submarine drills, the hauling winches and leveling posts — is provided by *seven* 900-cfm Gyro-Flo compressors. Also included are *forty* I-R air hoists and seven special I-R air motors.

DEPENDS ON AIR

With 6300 cfm of dependable Gyro-Flo air power, the "Hornet IV" is drilling and blasting at the rate of one charge (500 lb. of dynamite) every hour and 45 minutes. Here, virtually *everything* works by *air* — and the ability to maintain this unprecedented blasting rate depends on the *compressors*. Hence service-proved performance and exceptional freedom from maintenance were major factors in the selection of Gyro-Flo units for this important installation.

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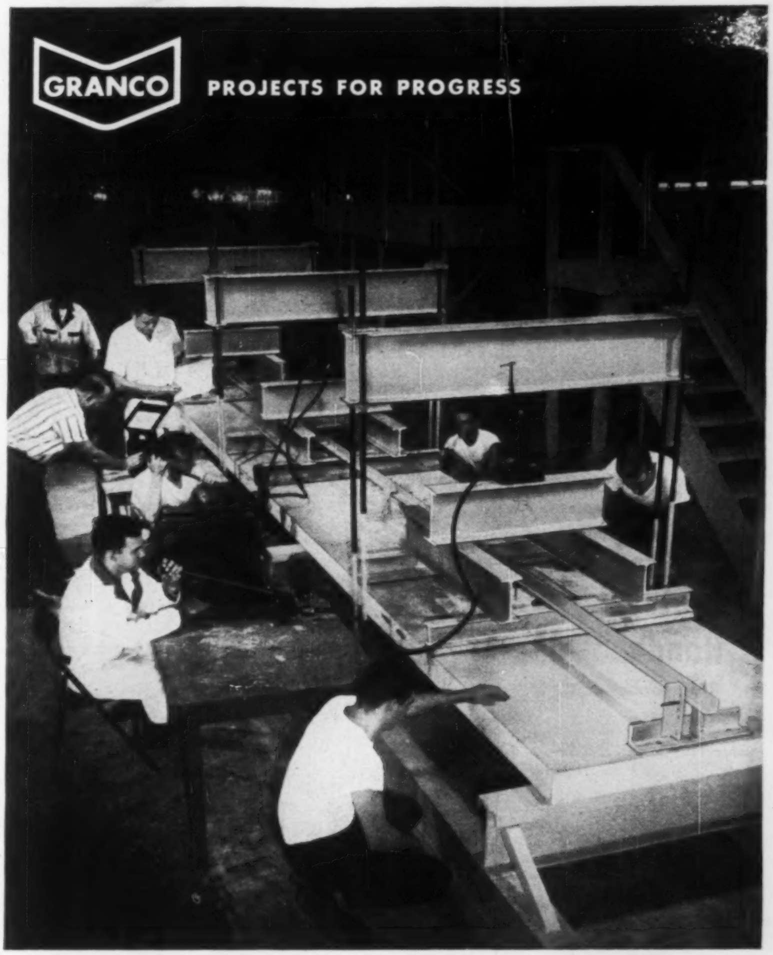
preferential assignment to Matson Navigation Co. Construction of a super tanker terminal in outer harbor is slated for completion in January 1959. Dredging of a fairway, 47 ft deep and 500 ft wide, on the breakwater entrance to the terminal site began in 1957. The terminal will have a total docking length of 1,100 ft and is designed to accommodate the largest super tankers now in service. The completion of the only marine terminal on the West Coast especially designed for petrochemicals. The facility built by McGuire Terminal Co., has 21 tanks and a total capacity of 75,000 barrels. Each tank has a separate pipeline from the dock to truck and railroad loading areas on the street side.

Final negotiations are in the process for construction of a $15 million passenger and cargo terminal for preferential assignment to American President Lines. The project will feature a 2 story passenger cargo building with dimensions of 1059x200 ft, and a cargo transit shed measuring 630x200 ft.

• **San Diego Port Facility**—Part of a $9.4 million project is already in use as needed for special cargos and the pier structure has been completed. First transit shed will be completed along with installation of trackage and paving about February 1958 and by April 1958 the pier should be wholly usable. It will be from 12 to 18 months, however, before the entire terminal area is completed.

• **Sacramento Deep Water Channel**—Work was completed on a $2.2 million dredging contract on this $39.5 million job which will bring California's capital city to an inland port status. At year's end work was nearly completed on a $1 million contract for a toe drain for the main channel in Yolo Bypass. Work is expected to begin in April on a $20 to $25 million job of dredging the navigation channel 25 miles long in Yolo Bypass. The channel will be 30 ft in depth and from 200 to 300 ft wide.

• **U. S. Highway 40**—The California division of highways is speeding up its program of constructing to full freeway standards the 211 miles of U. S. 40 between San Francisco and the Nevada State line with emphasis on construction in the Sierra Nevada, where the 1960 Winter Olympics will be held. When the projects now under construction and those to begin in 1958 have been completed there will be a total of about 83 miles of freeway or expressway in operation on the 117 mile length of U. S. 40 between Sacramento and the Nevada line.



HOW A TEST "WROTE THE SPECS" ON ELECTRIFIED FLOOR SAFETY

How many pounds can a "Electrically Ready" floor slab with header ducts and junction boxes actually support? Here's how Granco found out . . . testing its own products.

In the photo above, research technicians of Granco Steel Products Company use hydraulic jacks with 60-ton capacity to apply increasing loads to a three-span test floor.

The 130-square foot floor system consisted of a structural concrete slab—formed and reinforced with 1) Cofar steel units, and 2) E/R Cofar units containing UL listed electrical raceways. Header ducts and junction boxes were attached to E/R Cofar units at the region of maximum moment.

As hydraulic jacks applied increasing pressure, sensitive gages measured stress and strain. Cofar and E/R Cofar units work together to support the load. In this test, the floor supported a 170-psf design load. Finally—at 6.8 times design load—the slab failed.

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BRIDGE—Carquinez Bridge, duplicating older span shown above at left will aid the flow of traffic near San Francisco.

• **Carquinez Bridge**—Work advanced rapidly during 1957 on the Carquinez Bridge on U. S. 40 between San Francisco and Sacramento. Construction is more than 70% complete on $31 million of contracts for the parallel Carquinez span and new approaches. The bridge project is financed by toll supported revenue bonds.

Both bridges have two 1,100 ft cantilever spans, two 500 ft side spans and a 150 ft mid crossing tower. Nearly 98% complete is a $5.4 million substructure contract that features three 53x103 ft. open floating caissons that are sunk to firm foundation by using hydraulic jets to loosen and airlifts to remove the underlying mud and sand. Almost 80% done is a $7 million south freeway approach contract which features 9,700,000 cu yd cut.

• **Bayshore Freeway**—Projects under construction will add 8 miles and complete this freeway between San Francisco and Palo Alto, a distance of 35 miles. Three segments, currently in progress at a cost of $9.5 million, will be finished by midsummer. All are six lane freeway with provision allowed for future expansion to eight lanes. Last year (1957) a 4.2 mi "open water" link crossing San Francisco Bay was completed at a cost of $8 million.

Included in the 1958-59 state highway budget are further southern extensions of the freeway. One contract will take Bayshore 4.4 miles into Santa Clara County at a cost of $5.2 million. Another, to cost $5.1 million, includes 3.9 miles of freeway construction and a major Bayshore-Eastshore interchange near San Jose.

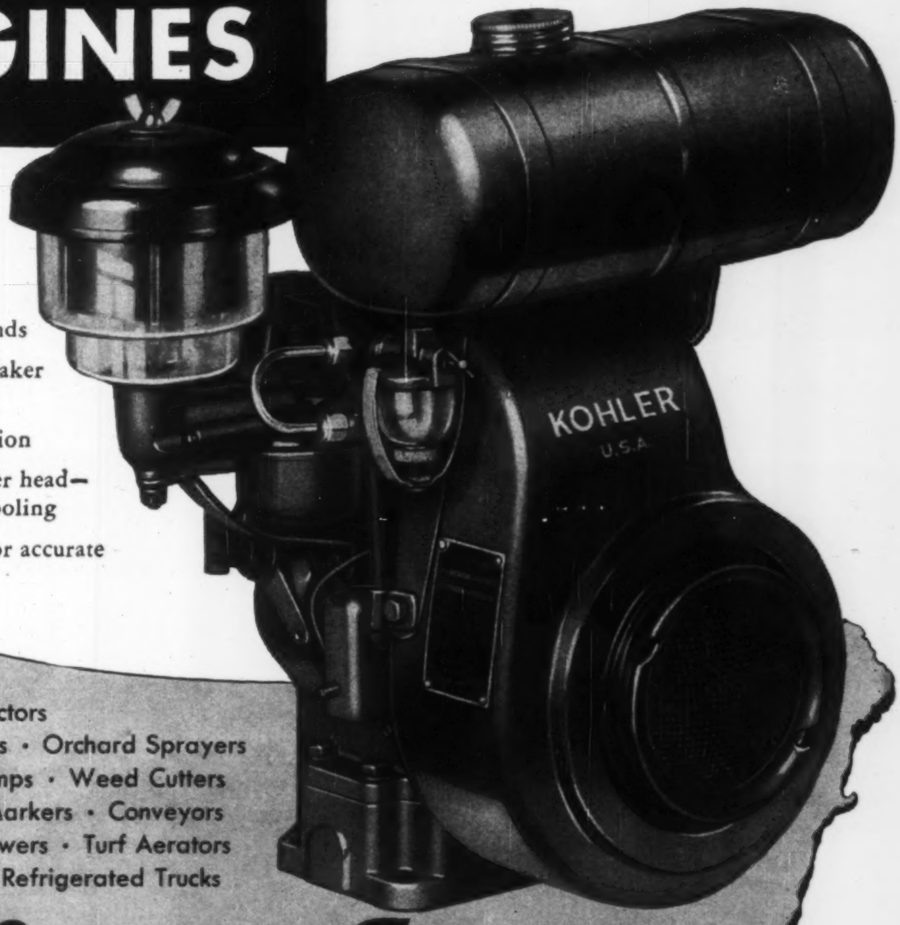
• **Richmond-San Rafael Bridge**—The double-deck, $68 million bridge across the north arm of San Francisco Bay went into full operation late in August. Upper level was opened to traffic a year earlier, then traffic was shifted to lower deck to permit erection of a new approach trestle on the upper deck. Completion of construction makes three lanes available for one-way traffic in each deck. The 4 mile long bridge combines cantilever structures, truss spans, and girder spans. The Division of Highways recently completed a 1 mile westerly approach to the bridge, and in 1958 will extend the 4-lane approach 1.1 miles to connect with U. S. 101 south of San Rafael.

• **Embarcadero Freeway**—This project is part of the network of fast new freeways linking San Francisco to its bridges and surrounding communities. Skirting San Francisco Bay above the docks and the Ferry Building, the skyway is supported by double-level concrete structures, and varies in width from 4 to 8 lanes. Two projects totalling $7.6 million were finished last summer, and a third, started in November, is slated for completion in May, 1959. The current $7.8 million project, about 1.2 miles long, provides a freeway connection from north of Market Street to the San Francisco-Oakland Bay Bridge and the Bayshore Freeway. It provides for a future extension south to a possible southern crossing of San Francisco Bay, and a future extension north to connect with the Golden Gate Bridge. The project includes two interchanges, channelized intersection work along the Embarcadero, and some reconstruction of railroad tracks.

• **Los Angeles airport**—Ground was broken in December 1957, marking the start of the $46 million expansion of the Los Angeles International Airport. Construction on the 265 acre site is divided into four phases, with the entire development scheduled for completion Jan. 1, 1960. The Griffith Co. of Los Angeles is currently working on the $2 million initial phase of the project—construction of an 8,925 ft runway, relocation of the maintenance yard, and development of other maintenance areas.

• **PG&E pipelines**—The utility will wind up its $10 million looping project in 1958 to increase capacity of the Super Inch Pipeline which carries natural gas 500 miles from the Arizona border to the San Francisco Bay Area. Several sections of looping, still under construction and adding up to 138 miles, are 75% complete. Work on compressors also will be finished early in 1958.

A $9.4 million, 12 in. gas transmission line from Corning to Eureka in



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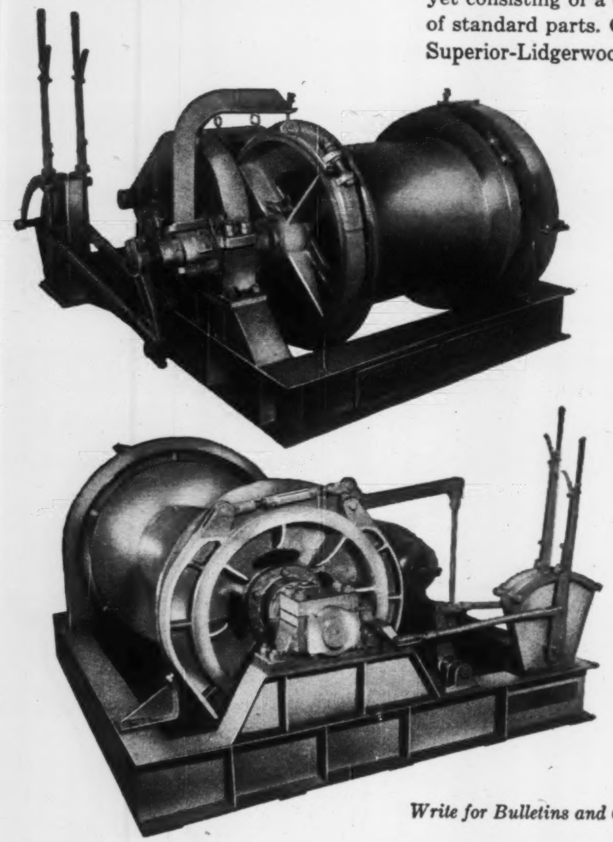

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Transportation

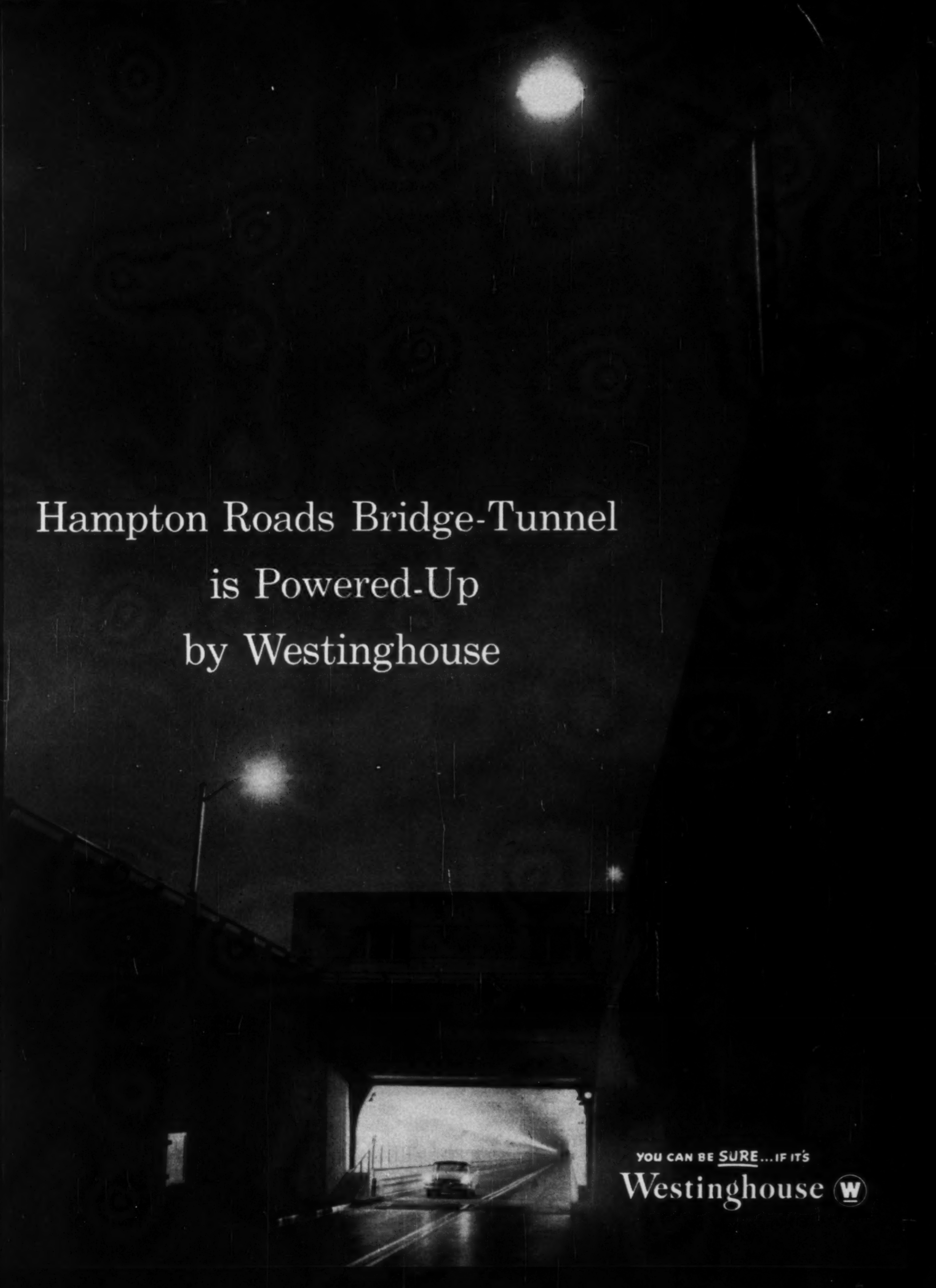
Northern California is 80% complete and will be finished in 1958. The 165 mile line was started in July. The job also includes a three mile extension between fields north of Corning and Red Bluff.

Salt Lake railroad fill—Work on Southern Pacific's Great Salt Lake crossing project in Utah is proceeding on schedule and currently is about 35% complete. The project, started in 1956, involves a 13 mile, $49 million fill across the north end of the lake to replace a nearby timber trestle. Completion is scheduled for 1959. By the end of the year, 11,500,000 cu yd of sand and gravel and 4,900,000 cu yd of rock were dumped into the lake by barge, truck, and train. Dredging is estimated at 75% complete, with about 11,500,000 cu yd of material scooped from the lake bottom by the end of December. Dredging operations should be completed in April.

Hilo Highway—The end is in sight for a major highway construction project in progress since 1947 along the rugged, gluch-pocked Hamakua Coast of the Island of Hawaii. To serve a rich, sugar-growing region that has switched from rail to highway transport, a 24 ft wide, 40 mile highway including 40 major and many minor bridges has been built from the port city of Hilo to the town of Honokaa at a total cost of $15.5 million. By the end of 1957, 33.5 miles were complete, 1.3 were under construction. The remaining 5.6 miles will go under contract in 1958.

Honolulu Tunnel—Progress has finally picked up on the Kalihi Valley route, where the city-county of Honolulu, T.H., is opening a new route across the Koolau Mountains, north of but paralleling the Oahu Highway route in use since the last century. A 2,773 ft tunnel started in January 1954 is now 90% complete and work was started Dec. 2, 1957, on a parallel second bore. A series of 1954 cave-ins 2,000 ft in the first tunnel had killed five men and led to litigation that delayed progress until an agreement a year ago between the contractor, E. E. Black Ltd., and the City-County of Honolulu. (Black subsequently was low bidder for the second tunnel also). The first bore is scheduled for completion April 1, 1958, the second for June 5, 1959. It is still not determined whether the first will be opened to traffic before the second is complete.

Only remaining contracts to be let are for the approach roads, most of which are being built by the Territorial Government as part of a Federal Aid program.


Hampton Roads Bridge-Tunnel
is Powered-Up
by Westinghouse
YOU CAN BE SURE...IF IT'S
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Hampton Roads Bridge-Tunnel Links Virginia Peninsula with Norfolk

Westinghouse Electrical Equipment is Used Throughout

The bridge-tunnel recently opened across Hampton Roads, between Newport News and Norfolk, Virginia, features many "firsts" in engineering and construction. Among the most interesting of these are the specially engineered uses of electrical power for illumination, ventilation and other required services.

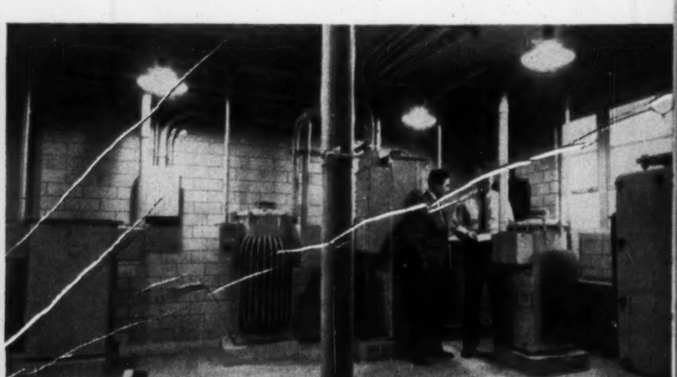
Both bridge and land approaches to the new 7,479-foot portal-to-portal tunnel are lighted with Westinghouse OV-20 mercury vapor luminaires, controlled from the central control panel. The interior of the tunnel is lighted with special Westinghouse fluorescent luminaires—employing enough fluorescent tubes to provide a single uninterrupted light line three miles long. Double rows of these fixtures provide high-intensity lighting at the tunnel portals, while the central portion of the tunnel uses a single row of lights on each side. Lighting intensities at both tunnel openings are controlled in relation to the daylight or darkness outside, so no abrupt visual adjustments to varying light conditions are required when entering or leaving tunnel. Special Westinghouse saturable reactors and controls were developed to provide this important lighting technique. The entire length of tunnel is so well illuminated that motorists will be able to switch off their lights while driving through it.

Special Westinghouse equipment controls sixteen vane-axial ventilating fans, eight at each end of tunnel, with a total circulating capacity of 3,408,000 cubic feet of air per minute. Eight fans supply fresh air to tunnel while the other eight exhaust contaminated air. Pitch of fan blades is variable and remotely controlled to permit accurate regulation of air volume handled by each fan. All fan operation is coordinated and controlled at central control board where four carbon monoxide recorders provide a constant check on the concentration of this gas throughout entire length of tunnel.

The entire electrical power requirement of tunnel

(cont'd)

Tunnel is lighted with special Westinghouse fluorescent luminaires installed in protective tubes of pyrex glass. Special bronze fixtures were provided by Westinghouse to mount lights and protective tubes and to facilitate cleaning and replacement.



Intensities of tunnel lighting are varied by means of saturable reactors. Also included in installation are lighting supply transformers and constant current regulators to control bridge and approach lighting. View of transformer room shows John L. Taylor of E. C. Ernst, Inc., Electrical Subcontractors and Engineers, and William G. Phillips, Westinghouse Service Engineer.

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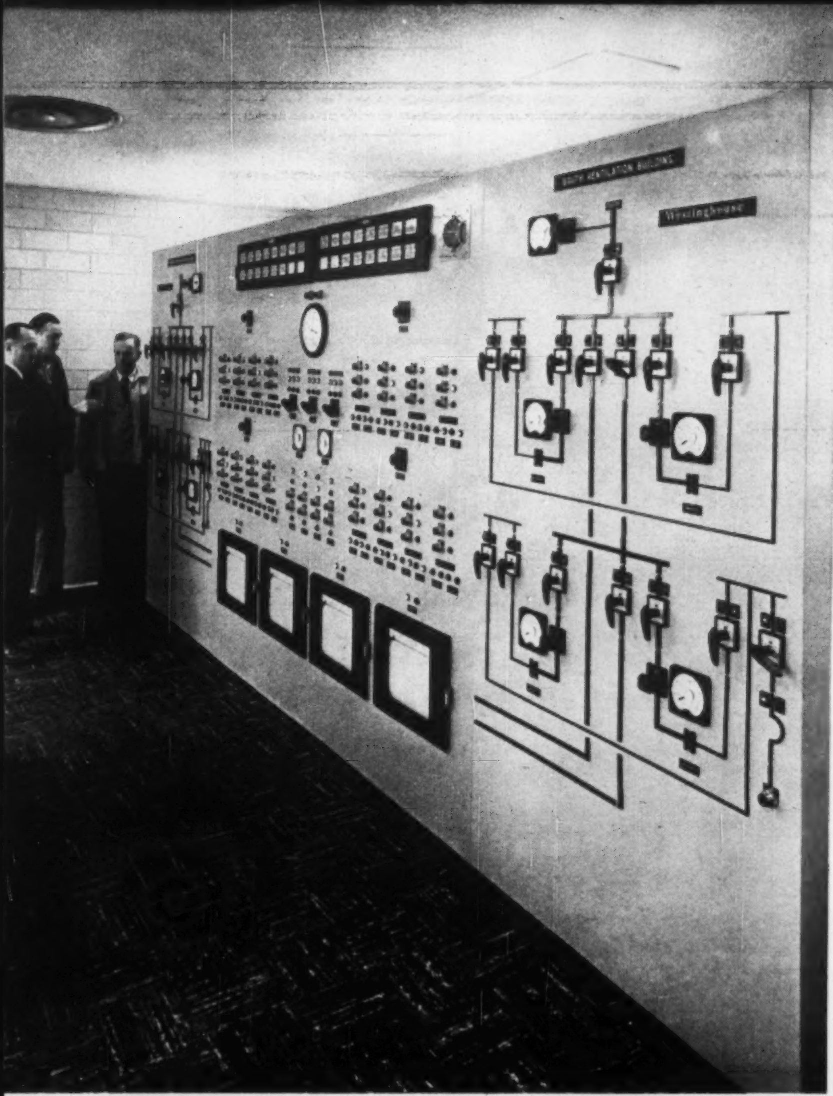

A Westinghouse special master tunnel control board allows operator to supervise tunnel operation from central point. Both tunnel illumination and ventilation are controlled from this board. Ventilating rates can be adjusted by varying number of supply and exhaust fans in operation and by changing fan speed and blade pitch to increase or decrease fan capacities. Also incorporated are alarm indicators, carbon monoxide recorders, time switches and other indicating and control devices. M. B. Trimble, Westinghouse Construction Sales Engineer; James McMahan, Bridge-Tunnel Superintendent, Virginia Department of Highways; and Harry D. Mahoney, Engineer, Parsons, Brinckerhoff, Hall and Macdonald, Consulting Engineers, discuss control board.

Westinghouse double-ended power centers utilize 1000-kva Inerteen®-immersed power transformers. Incoming power service enters metal-clad switchgear located between step-down transformers. Close-coupled to transformer secondaries are low-voltage switchgear assemblies, special fan control cubicles and control centers for tunnel auxiliaries.

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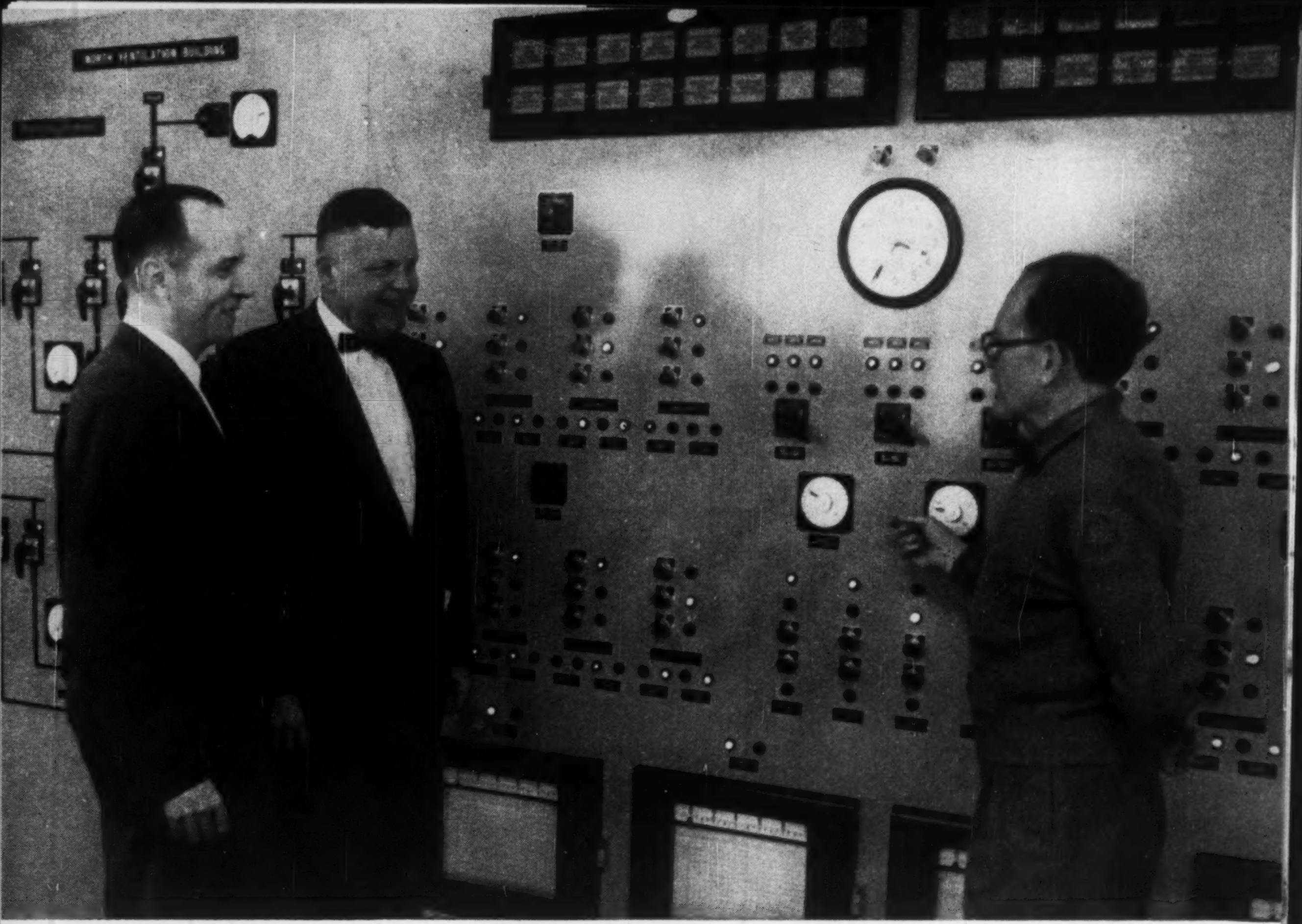

Close-up of center of tunnel control board shows M. B. Trimble, Westinghouse Construction Sales Engineer, with Maurice N. Quade and J. O. Bickel of Parsons, Brinckerhoff, Hall and Macdonald, Consulting Engineers, Designers and Supervisors.

is supplied through four identical Westinghouse 2000-kva power centers, two in each ventilation building on man-made islands at each end of tunnel.

This is another example of how Westinghouse can help engineers and contractors satisfy electrical distribution requirements. For information applying to your specific needs, see your Westinghouse electrical construction engineer. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

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Bridge approach to south end of Hampton Roads Tunnel. Illumination for both approaches is provided by Westinghouse OV-20 mercury vapor luminaires controlled by time switches and photoelectric relays.

Owner: Commonwealth of Virginia—Department of Highways

Consulting Engineers: Parsons, Brinckerhoff, Hall and Macdonald

General Contractors: Merritt-Chapman & Scott Corp.
(Approach bridges, portal islands, cut-and-cover sections, underwater tunnel)

Tidewater Construction Corp.
(Portal approaches, ventilation buildings, mechanical and electrical work)

Electrical Subcontractors: E. C. Ernst, Inc.

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Westinghouse Data
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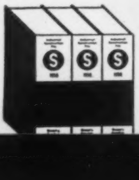


Toward Unity Among Developers

River controllers, water suppliers and pollution abaters stride toward comprehensive planning of water resources

MISSOURI RIVER development, which has low flow augmentation purposes, is symbolic of trend. Shown is Jackass Bend cutoff for navigation and flood control.

Over the years, lip service but little implementation has been given the theme that the nation's water resource developers must take into account all of the many uses of water. Specifically it is held that power, navigation, flood control and irrigation planners must not disregard water supply, pollution control and recreation purposes.

Last year saw an encouraging amount of progress toward this end. Enough, in fact, to justify treating all water uses as simply aspects of a single subject for the first time in this Annual Review and Forecast Issue—one Water Resources section in place of individual sections on River Use & Control and Water Supply & Sanitation, as presented previously.

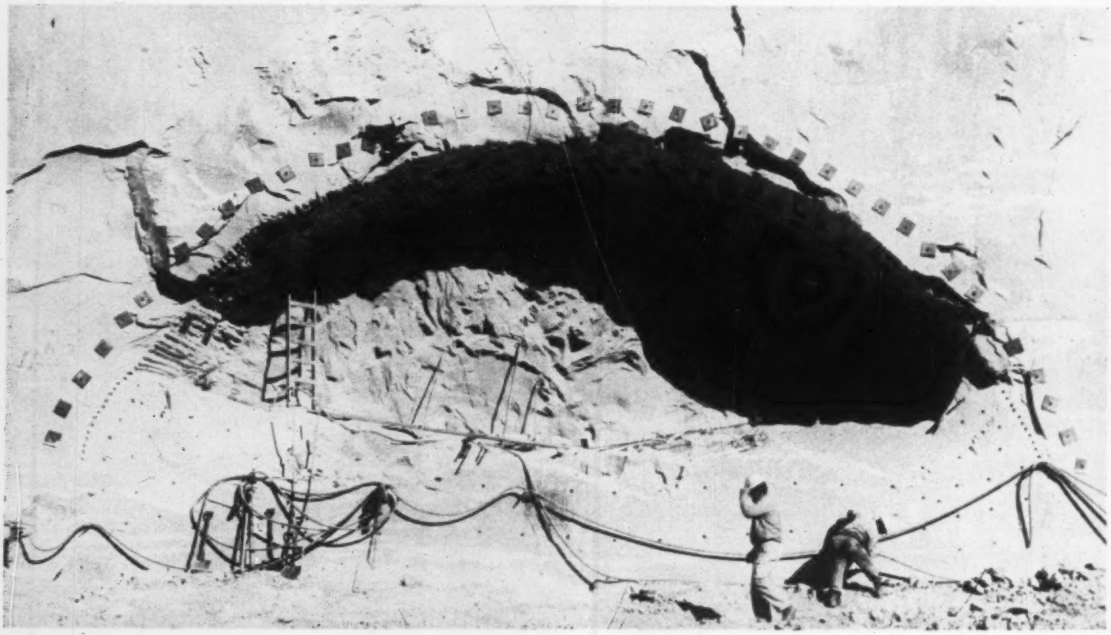
Several broad factors are operating inexorably to unite the water resources field in its thinking:

Although big-dam construction for power, irrigation, flood control and navigation is at its peak right now, the point of ultimate development for these purposes can be seen on the horizon. During the next 25 years or so, hydro will give way to nuclear power, the nation's rivers will be channelized for navigation to the economic breaking point, most major flood control structures will be erected and there will be little land left that can be irrigated profitably.

Conversely, the water supply star, and with it waste disposal, is in ascent with no foreseeable limit on its rise. The demand for water and the need for waste disposal, by industry particularly, will soar. And, as is already happening, the projects will grow larger and reach farther as close-in water sources are developed to their limit.

Thus, water supply and pollution control are assuming more controlling roles in the water resources picture. This is happening regardless of the water planners. The transition period can be better served, however, if more water planners view each water question in its broadest, and act accordingly.

Much happened in this regard in 1957. The Corps of Engineers commis-



GLEN CANYON DIVERSION TUNNEL, the left one, is getting under way as a prelude to dam and power plant construction under the largest single construction contract ever—$108 million—at the largest unit of the Upper Colorado River Project.

. . . 1957 was a "rock" year

sioned Buford Dam on the Chattahoochee River in Georgia, with low flow augmentation and storage of water for domestic and industrial use as important objectives. Releases from the great Missouri River dams similarly provided downstream water supply and aided pollution abatement. Studies continued toward determining the effect deeper pools on the Ohio River—as a result of the current navigation improvement program—will have on the stream's self-purification process. And on the Kalamazoo River, faced with a situation wherein additional sewerage treatment plants would be of no avail because the receiving stream's assimilative powers are exhausted, cities in Michigan embarked on an enlightened program to increase flows by building upstream dams.

While California's great water plan, which embodies all of the water uses, remained stalled, Texas moved forward boldly by enacting a $200 million loan program under which river authorities and municipalities can obtain construction loans at low interest. Much of the planned construction will go for truly major river projects to supply industrial and domestic water. The same Texas legislative session gave the State Board of Water Engineers its first real money to produce a comprehensive state water plan. And in New Jersey at year's end, diverse interests seemed ready to get together on a water supply plan involving the Raritan and Delaware rivers, and involving flood control and Pennsylvania as well.

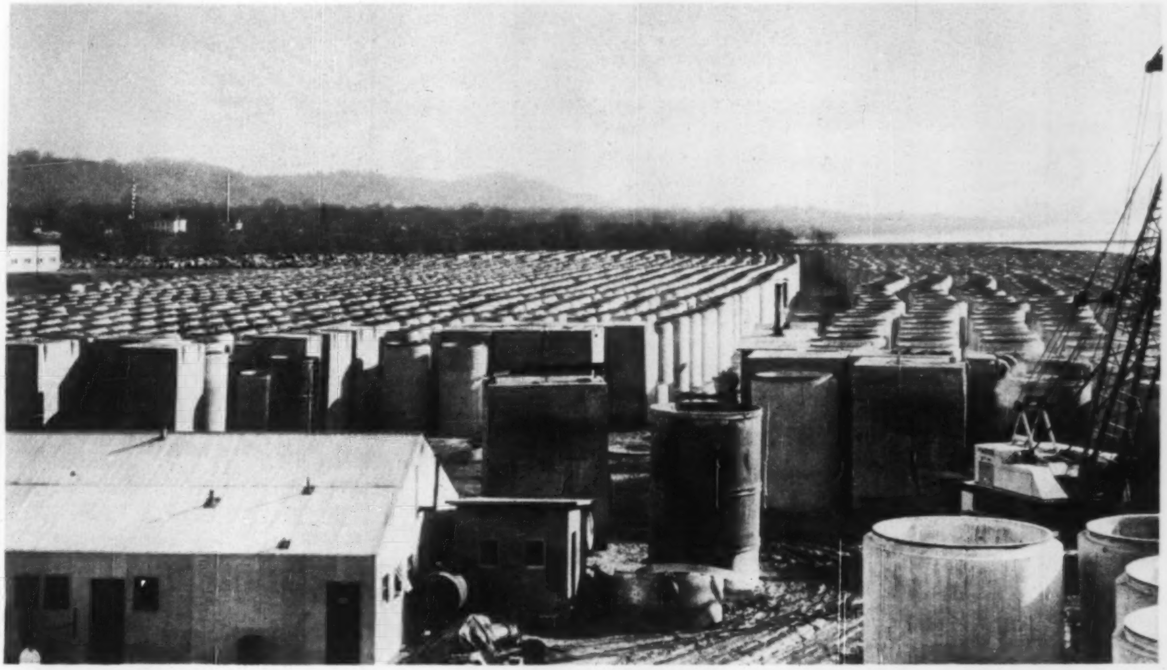
National water policy statements issued by Engineers Joint Council and the American Water Works Association during the year also had a salutory—if yet unacted upon—effect on unified water development thinking. The EJC statement, in particular, laid special stress on the need for greater cooperative participation by state, local and private agencies in resource development.

Increased non-federal action in this field is really part and parcel of the new thinking. Because the up and coming water supply and waste disposal aspects have been almost the exclusive preserve of non-federal agencies, it is logical that state and local roles, the state role especially, will grow. Ample evidence is available in the California, Texas and New Jersey activity noted above, and in a veritable rash of activity by many other states during 1957.

• **Water law conflicts**—As the states take an interest in water problems they soon stumble on the water law question. And as water becomes scarce in many areas, projects will be held up if the question of who gets how much water is not settled. Nowhere is this more apparent than in California where the controversy over water rights between water-rich north and water-short south prevented a major appropriation by the state legislature for a hoped-for construction start in 1957.

Southern California interests, who want to be guaranteed delivery of water from projects for which their end of the state provides most of the money, delayed decisions during the 1957 legislative session. Since then, Northern California groups, who are afraid of losing their water heritage irrevocably, have rallied forces for a hard fight. So there seems little chance that agreement will be reached even this year.

Other prominent water rights controversies in evidence during the year were those between upper and lower Colorado River states over Bureau of Reclamation's plan to fill Glen Canyon reservoir; between Arizona and California as a special court master made ready to resolve the long-standing dispute; between New York City and neighboring states over whether the former was exceeding its diversion rights on the Delaware River; between Chicago and Great Lakes states over the former's attempts to increase sewage-



MILES OF CONCRETE PIPE, cast on site to rigid specifications, will be used as tunnel liner in Allegheny's County Sanitary Authority's $80 million waste collection and treatment project involving 33 miles of sewer in tunnel Construction is near end of second year.

flushing diversions from Lake Michigan; and between water engineers and lawyers over the latter's presentation of a "model" water law at a special Michigan Law School conference. Even the Columbia River impasse between Canada and the U.S., which remained as far as ever from solution in 1957, has its roots in water rights assignment.

All this adds up to the fact that before development can proceed very far in many areas of the U.S., a solid foundation of water law must be established. Most states (water law is a state function) now recognize this, and many legislatures took encouraging actions during 1957.

A 48 state survey by ENR showed most every state doing something. In the East, progress toward major revampings of riparian laws to define "reasonable use" and to allow more use by non-riparians was generally in the getting-acquainted-with-the-problem stage. Western states were more advanced, as legislatures considered numerous bills introducing flexibility into the "first in time, first in right" principle of their appropriative laws.

- **A "rock" year**—For construction contractors on major water projects, 1957 can be said to have been a "rock" year. An unusually large number of the year's most significant water resource jobs revolved around large-scale rock excavation. Underground powerhouses—big ones and difficult ones—attracted much attention. Hard rock tunneling techniques—in drill patterns, drilling equipment and speed of advance—were improved. Rockfill dams—of record heights, novel facing and quick construction—seemed to be going up everywhere. And the biggest rock job of them all, the 30 million cu yd Niagara Power Project, became an assured reality in 1957.

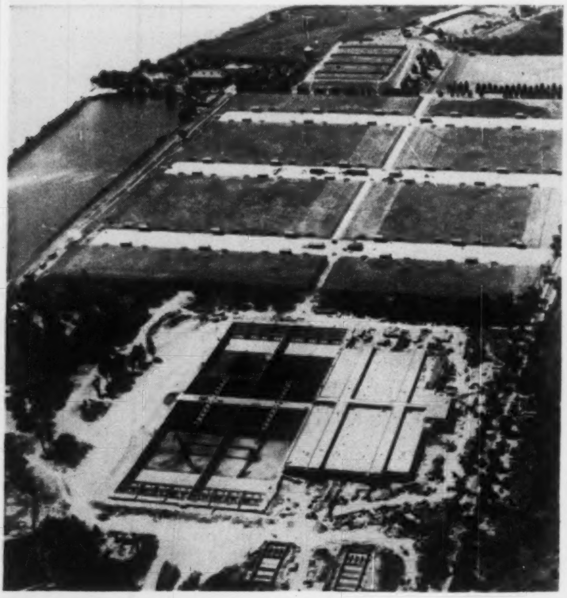
The first major underground powerhouse in the U.S. got under way importantly last year. It is the 128,000 kw Haas powerhouse of Pacific Gas & Electric Co. on the Kings River in California. Construction of the 173 x 56 x 85 ft high chamber features a new type of roof bolt and pneumatic placement of a wire-mesh-reinforced concrete ceiling.

The Haas work sparked much interest in the U.S., evidenced by a special symposium on underground powerhouses at the American Society of Civil Engineers' October convention in New York. There, it was freely predicted that more underground power development can be expected in the U.S. (though perhaps never as extensive as Italy's 57 completed plants and Sweden's 26).

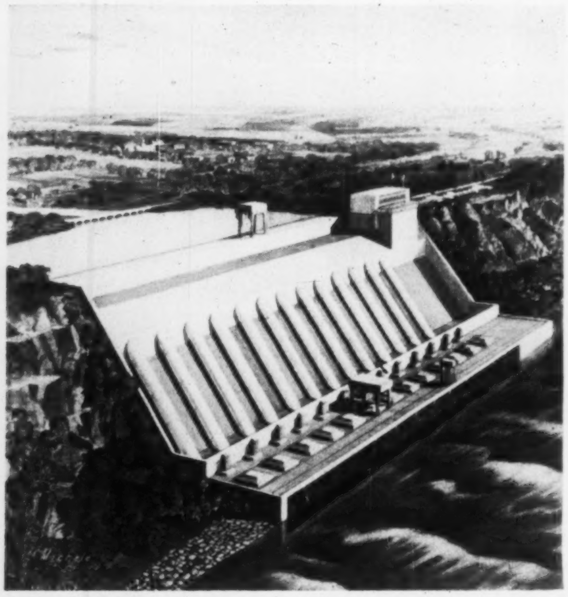
- **Tunneling techniques**—Other notable underground plants in the spotlight in 1957 were the 1 million hp Chute-des-Passes project in the Quebec bush (which features a 48 ft dia 9,000 ft long tailrace tunnel) and the Stornorrfors station in Sweden, where special blasting techniques achieved exceptionally smooth surfaces in the underground cavern. Also at Stornorrfors, a new world's record of rock removal (38,000 cu ft per day averaged over the job) was set in driving the 1,720 sq ft top heading of the 52.5 x 87 ft tailrace, the world's largest tunnel section to date.

Meanwhile, U.S. miners in New York City's 44 mile West Delaware Tunnel believed they had set a record of their own: 8¾ miles of 13½ ft bore from five headings in just seven months. But a more significant aspect of this job was the use (by contractor Drake-Grafe-Tecon-Winston-Conduit) of two 5½ in. dia "burncuts" in the center of the shale and sandstone face to eliminate difficult pyramid drilling. A second contractor on this job (McLean-Grove-Hunter) is doing his friendly rival one better by drilling an 8 in. dia burncut with an adapted vertical rock drill.

Still a larger burncut, 14 in. in dia, is being drilled in a 17 x 19 ft heading for a Chicago water supply. Here, though, the bigger story is in the radically different drilling equipment employed by the contractor—Grafe-Tecon-Mittry-Drake. The huge 14 in. unit and four drifters are rotary drills, power by hydraulic pumps, in turn powered by electric motors mounted right



ONE OF THE LARGEST water plants, at 282 mgd, is well along (foreground) in Philadelphia at Torresdale works (background).



THE LARGEST power project in the free world, at 2.2 million kw installed, will soon be under way at Niagara Falls.

. . . River money flowed, but policy didn't

on the jumbo. The big advantages: faster and quieter than pneumatic drilling, cheaper than bringing compressed air to the tunnel face.

• **Dam designs**—Five major rockfill dams in the U.S. were in the news during 1957, each significant for a different reason. Brownlee Dam on the Snake River in Idaho, to be the fourth highest rockfill at 395 ft, is notable for an extremely fast construction schedule: the 6 million cu yd structure is to have first power on the line this year, some 34 months after contract award. Wishon and Courtright dams on the Kings River in California, 290 ft and 310 ft high, respectively, are coreless structures whose concrete facings allowed steeper than usual upstream slopes (1:1).

Another coreless rockfill, 113 ft high Montgomery Dam on the South Platte River in Colorado, stood as the first of its type in the U.S. to employ an asphaltic concrete facing as the watertight membrane. And what is to be the world's highest rockfill, 445 ft Cougar Dam on the Willamette River, got under way last year.

As with underground powerhouses, the current activity in rockfill dams has sparked an ASCE Power Division symposium, scheduled for the Portland, Ore., convention this June.

• **And now, Niagara**—In August of last year, Congress finally approved construction of the great Niagara Power Project by the Power Authority of the State of New York, ending a bitter seven year battle over who would build the project. Niagara's 2.2 million kw of installed capacity will rank it with Grand Coulee as the largest powerhouse in the Western Hemisphere (the Russians claim larger hydro stations under way). Construction of the huge project, now estimated to cost $475 million, will require removal of about 30 million cu yd of rock, making it most notable in this respect. A $98.3 million contract for the main powerhouse has been let.

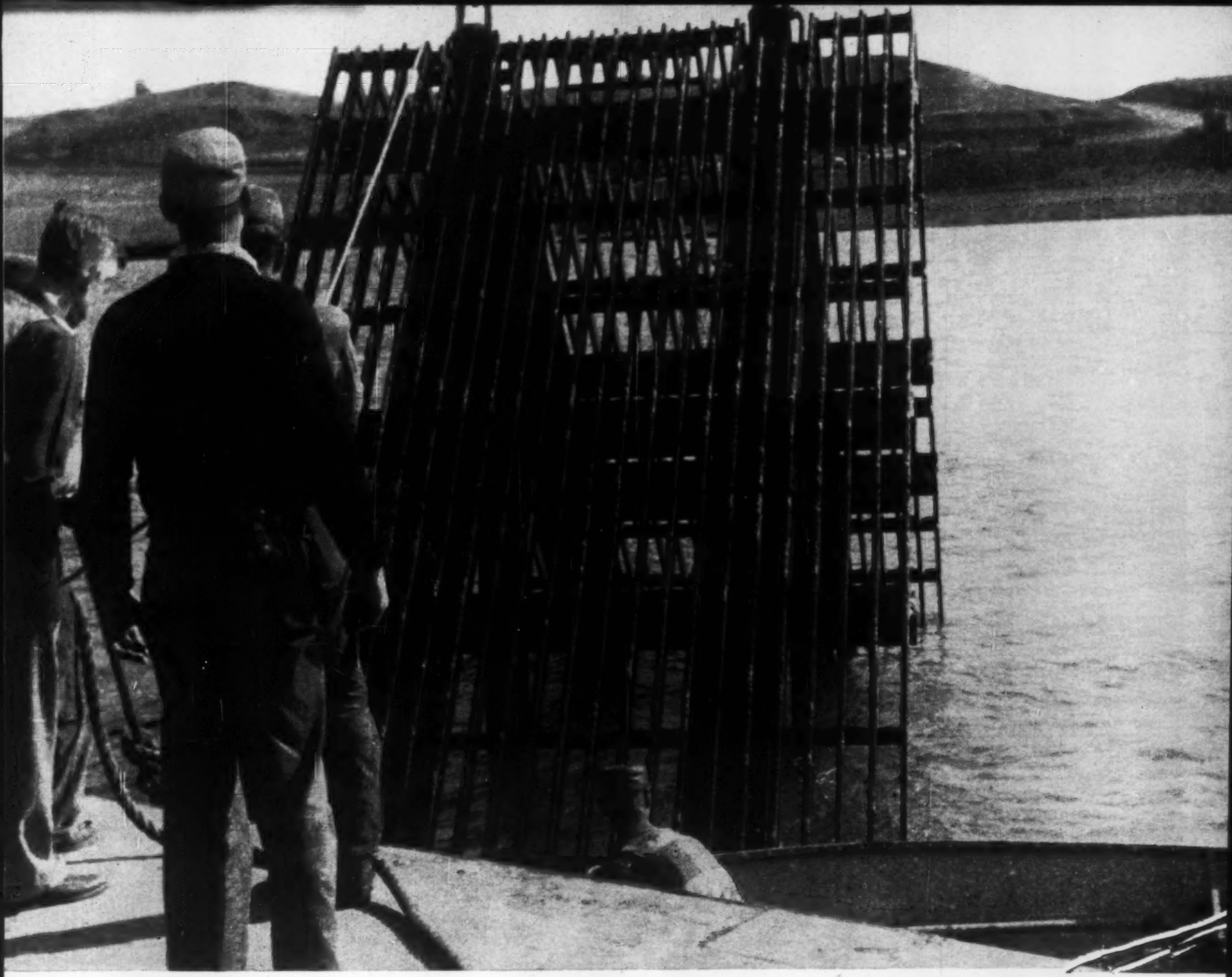
Thus, 1957 was, and 1958 will be, a rock year. Out of this continued activity are bound to come more truly significant advances in the difficult and uncertain business of moving rock. Such advances should have important bearing on the relative economics of construction in rock, compared to alternatives, in the future.

• **Money and policy**—1957 was another good year, moneywise, in the river use and control field. Public contract awards, most of them federal, totaled $969 million compared to $730 million in 1956. Private hydro awards, meanwhile, dipped to an estimated $50 million from $300 million in 1956. However, 1956 had been an extraordinary year for private water power awards.

For a time, Sputnik threatened to have a diminishing effect on federal awards in the year ahead, because of diversion of federal money into missile efforts. However, due to the recession at year's end, and perhaps due to a strenuous campaign by water resources interests, federal spending this year has been programed to hold at the $750 million level of the two previous years, although no major starts are planned. Total river development awards in 1958 should rise, then, in view of $400 million or so worth of contracts expected to be let at Niagara.

The question of who will build dams in the arid West seemed to become clear last year. Everyone will: Federal, local public and local private agencies. The pattern is not one of true partnership in that federal and local agencies are not as yet sharing costs on individual projects. Thus, the Bureau of Reclamation has started Trinity in California and Glen Canyon in Arizona, and Corps of Engineers is working on Ice Harbor and Cougar in the Columbia River basin, while local public and private agencies are constructing Priest Rapids, Noxon Rapids, Swift, Rocky Beach and Brownlee in the Columbia basin and Wishon, Courtright and Tri-Dam Project in California, among others.

In the Pacific Northwest, conflict between public and private power advocates continued fiercely over the Pleasant Valley damsite in the lower Snake, less fiercely over Hells Canyon upstream a ways, and rather quietly between the U.S. and Canada over future Columbia River developments. Only the



Forty-six of these all-welded wrought iron trash racks guard the entrance to four 24⅔-foot diameter water intake tunnels at the Missouri River's hydroelectric generating station, Fort Peck Dam, Montana.

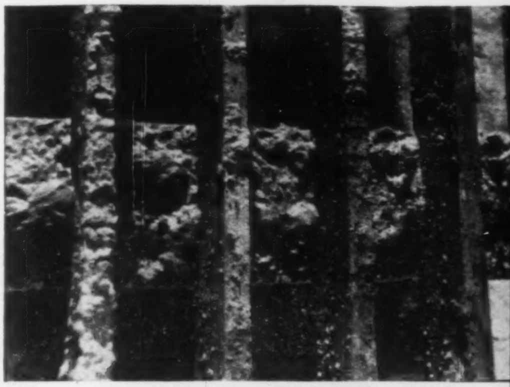
Wrought Iron trash racks pass rigid inspection after twenty years use at Fort Peck Dam

The assignment was corrosive. Guard duty at the bottom of the Missouri River—twenty years of it. In a hard-to-get-at position for thorough inspection, until just recently.

That's the service record of wrought iron trash racks used to prevent powerhouse turbine damage at the hydroelectric generating station, Fort Peck Dam, Montana. And the only maintenance required—after this bout with marine-type corrosion—was a cleaning with high pressure water spray.

Briefly, here's how U. S. Army Corps of Engineers carried out the inspection. In bringing the racks to the surface for their first complete examination, divers connected lifting equipment to lifting holes in the tops of the racks. They were then removed from the tunnel intakes, raised to the surface and put ashore. After inspection (the rating was excellent), the racks resumed their tour of corrosive duty at the bottom of the muddy Missouri.

Wrought iron won't perform miracles. No metal can. But wrought iron *will* provide you with a more economical run for your money than any other metal you care to name. Write our Engineering Service Department for specific information. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

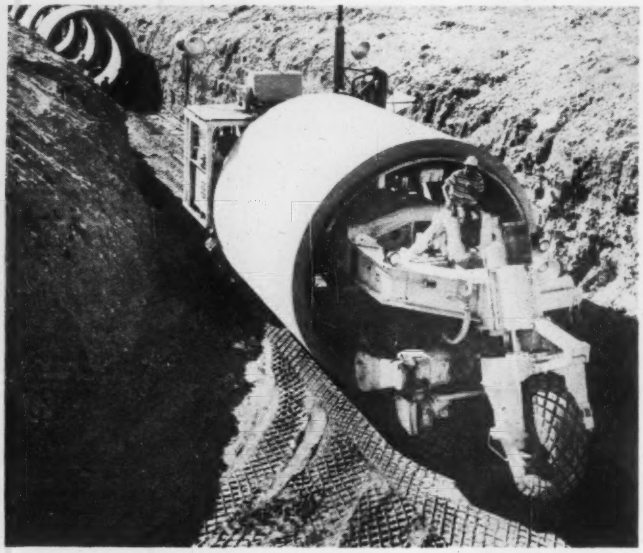


Laboratory analysis of a small sample of tubercle material which had formed on the racks revealed that at no place where the bars had been scraped were the pits under the tubercles more than 3/32-inch deep.

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE AMBALLOY STEEL PRODUCTS AND PVC PIPE

Corrosion costs you more than Wrought Iron



UNDERGROUND POWERHOUSE, first major plant in U. S., is Haas unit of Kings River Project in California.

THE PIPEMOBILE, a self-propelled pipelaying rig, is paying off on Colorado River Aqueduct expansion.

. . . State pushes flood plain zoning

Hells Canyon question was settled, as efforts to scuttle Idaho Power Co.'s three dam scheme failed to pass in Congress.

The delay in settling the big Columbia River question, over payment for downstream benefits provided by Canadian dams and over whether Canada will divert a portion of Columbia River water, appears to be aiding the U.S. cause. Both countries need more power by the early 1960's. But while the U. S. (mainly private interests) is turning to a number of undeveloped sites in the Columbia basin, Canada must open up for development one of a number of new areas. She must turn soon to the upper Columbia (cheapest), the Fraser River (blocked by fish interests), the Peace River (still unexplored) or start building thermal plants (at higher cost than Columbia hydro). So the greater amount of pressure appears to be on Canada to settle the Columbia River question.

• **Flood control**—One of the smallest states in the union contributed the year's brightest accomplishment in flood control. At year's end Connecticut was about halfway through actually establishing flood plain zoning lines throughout the state. Under a program passed in the aftermath of the catastrophic 1955 floods, the state Water Resources Commission was authorized to establish these lines through all municipalities encroaching upon the flood plains (along 150 miles of rivers in all). The program moved into high gear last year, after considerable time and money was spent in devising a design flood formula (in most places 5 times the mean annual flood) which takes into account existing and presently planned control structures.

Connecticut's accomplishment in putting over this program (which is to be detailed in an early issue of ENR) is expected to encourage many other states to tackle this much-needed but politically unpopular job.

Flood control structures had a particularly good year in the damage-prevented category. Local and federal dams and floodways in Texas and surrounding states combined to prevent $100 million of damage during spring flooding which did do about $60 million of damage. In the Tennessee Valley, TVA dams prevented $66 million of damage, while permitting none to occur.

One discouraging note was the shelving of the embryonic flood insurance program which got such a hopeful start in 1956. Congress last year refused to appropriate $14 million to get the program started. Congress will get another chance this year.

• **Notable projects**—The Upper Colorado River and St. Lawrence Power and Seaway Projects continued in the spotlight during 1957. The record for dollar size of a single construction contract was broken in April by an award of $108 million to Merritt-Chapman & Scott Corp., New York, to build 700 ft high Glen Canyon Dam and powerhouse on the upper Colorado in Arizona. The contractor bid alone in this day of joint ventures just as he had done in 1956 to set the previous dollar size record of $91.8 million for Priest Rapids Dam and powerhouse. And again this January, MC&S went alone on its $98.3 million low bid for the main powerhouse at the Niagara Power Project.

On the St. Lawrence, engineers and contractors breathed a lot easier as the race appeared won at the close of the third and last big construction year on the $800 million project. Only one last scene in the complex river-juggling play remains—raising the pool behind the International Power Dam this July 1 to open Long Sault Canal to limited (14 ft) navigation. Initial power production is scheduled for September, while the Seaway is to be open to 27 ft depth for the 1959 navigation season.

Much more than just a scene remains, however, as far as relating the lasting significance of the St. Lawrence construction story. At ASCE's Buffalo meeting in June, the engineering saga was well documented, but the notable construction difficulties, and differences between U. S. and Canadian methods, remained unexplained. There is much of significance to the construction industry here: in the bidding for Seaway earthmoving wherein contractors reportedly lost heavily because they figured the area's glacial fill and marine clay incorrectly; and in the markedly different concreting methods employed

THESE PORTABLE PUMPS PRIME AT 30 FEET LIFT!

When rain, springs or seepage is clobbering construction, it's good to have Gorman-Rupp "80" Series Pumps ready in the equipment pool.

These new pumps prime and reprime at lifts of up to 30 feet. They move easily because of their lightweight, aluminum construction. (The Midget weighs only 48 pounds.)

Look at the cutaway views. *Straight-in suction* delivers liquid directly to the impeller's eye. Capacity, efficiency and suction lift are increased. No *check valve.*

Four models:
- *Midget,* 1½", 6,500 GPH, 2.25 HP;
- *Pelican,* 2", 8,500 GPH, 2.75 HP;
- *Hawk,* 2", 12,000 GPH, 5.5 HP;
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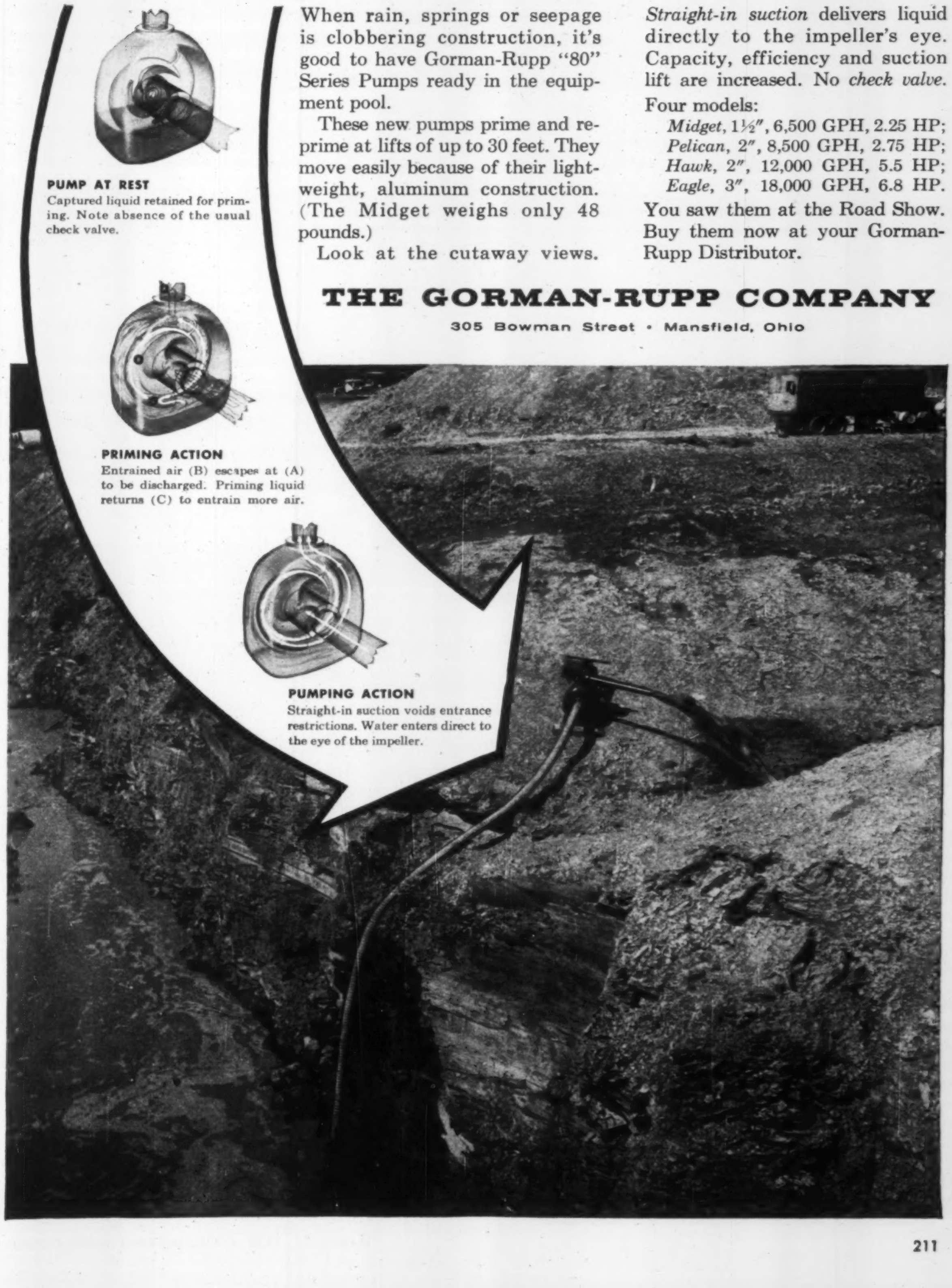


PUMP AT REST
Captured liquid retained for priming. Note absence of the usual check valve.

PRIMING ACTION
Entrained air (B) escapes at (A) to be discharged. Priming liquid returns (C) to entrain more air.

PUMPING ACTION
Straight-in suction voids entrance restrictions. Water enters direct to the eye of the impeller.

GAP IN OAHE DAM on Missouri River will be closed this summer in spectacular 24 hour rock dumping scheme which was checked out by electronic computer.

. . . Big year for sewerage construction

by U. S. and Canadian constructors working side by side on the power dam (limited winter concreting and horizontal progress vs. year-round concreting and concentration on a few units at a time).

Another distinguished non-rock job during 1957 was Swift Dam, a 15 million cu yd earthfill and the world's highest at 512 ft, which is to be completed this year, only 30 months between first contract and first power.

• **Dam technology**—Construction feats overshadowed dam design advances last year, but there were a few noteworthy items, aside from those already mentioned. At Oahe Dam, tricky shale and bentonite prompted the adoption of inverted siphons (to get into better rock) for the power tunnels. These will be 29 ft dia bores varying from 3,100 to 3,800 ft in length. Also at Oahe, electronic computers helped to determine key numbers in a spectacular 24 hour closure scheme scheduled for this August. The Missouri River is to be stopped by dumping 2,500 cu yd of shale into a narrow channel left through the dam faster than the river can carry it away.

A Japanese design of a 210 ft high thin arch, with six submerged orifices to pass floods, proved successful; the problem at Tonoyama Dam was a V-shaped gorge only 350 ft wide at the dam's crest. A 630 ft high concrete domed arch on the Kurobe River, designed by Japanese engineers, also got under way during the year.

• **Sewerage construction up**—The big news in the waste disposal end of the water resources business continued to be Public Law 660, the Federal Water Pollution Control Act passed in 1956, providing $50 million a year of federal aid for sewage plant construction. It was apparently achieving its purpose of stimulating construction.

Contract awards for calendar year 1957 totaled $556 million (including plants, interceptor and local collection systems), compared to $579 million in 1956. But since the 1956 figure includes the unusually large $80 million Allegheny County Sanitary Authority job in and around Pittsburgh, last year's total is regarded as an increase.

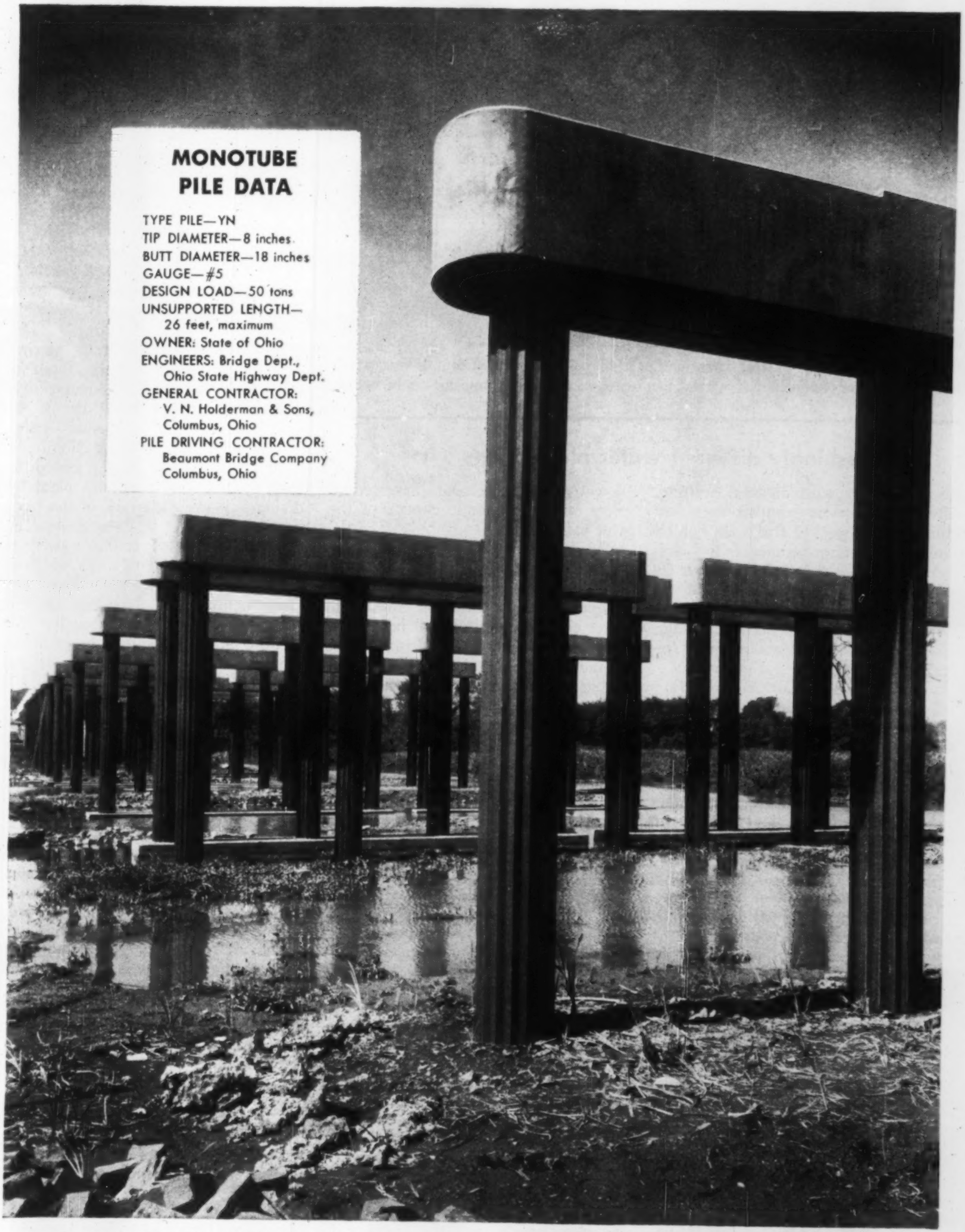
All concerned with the aid program had great praise for its administration by the U. S. Public Health Service. PHS has succeeded in preserving the dominant role of the states in this federal program, a situation comparable to the widely acclaimed relationship of the Bureau of Public Roads and state highway departments.

Federal aid to municipalities appeared to have sparked state aid efforts. Last year, Maine joined Pennsylvania by enacting a direct construction grant fund (Pennsylvania makes an annual grant based on operation and amortization costs) while many other states considered similar programs. Construction aid to municipalities appears to be a growing trend; once a sizable number of states have established such programs most of the others should follow suit quickly.

More than in previous years, 1957 was a year in which everyone talked about sewage lagoons, or stabilization ponds, and quite a few people were building them. Many small cities between the Mississippi River and the Rockies, and a surprising number in the East, saw these inexpensive but effective lagoons (under the right conditions) as the great white hope. For their part, technical societies devoted considerable time to papers which had as their main objective determination of rational, or at least empirical, design standards for these ponds which thrive on sunshine and wind. About 500 lagoons are now in operation in the U. S. and the number is expected to skyrocket in the next few years.

• **New treatment schemes**—A bright new adaptation of the activated sludge process was unveiled for American Cyanamid's Bound Brook, N. J., industrial waste treatment plant to start up this spring. To treat a waste that contains much material inhibiting biological stabilization and no solids to speak of, the company designed a 24 hour detention period in the aeration tank (compared to the 4 hours or less in normal activated sludge plants). While applauding the brilliant pilot plant work that led to the design, sanitary engineers saw application possibilities of the lengthy aeration time to other difficult industrial wastes.

Last year the much maligned "package" treatment plant field gained a new entrant, Dorr-Oliver's CompleTreator. But whereas the other leading producers employ air movement as the basis, the latest unit is a two-stage trickling filter



MONOTUBE PILE DATA

TYPE PILE—YN
TIP DIAMETER—8 inches
BUTT DIAMETER—18 inches
GAUGE—#5
DESIGN LOAD—50 tons
UNSUPPORTED LENGTH—
26 feet, maximum
OWNER: State of Ohio
ENGINEERS: Bridge Dept.,
Ohio State Highway Dept.
GENERAL CONTRACTOR:
V. N. Holderman & Sons,
Columbus, Ohio
PILE DRIVING CONTRACTOR:
Beaumont Bridge Company
Columbus, Ohio

VERSATILITY plus ECONOMY with Monotube piles. When soil conditions at this site in Mansfield, Ohio, prohibited conventional construction in crossing low-lying land, this adaptation of a foundation supported on Monotube steel piles proved to be an economical solution.

Tapered, fluted Monotube piles are available in lengths, diameters and gauges to meet every requirement. Write The Union Metal Manufacturing Co., Canton 5, Ohio, for complete information.

UNION METAL

Monotube Foundation Piles

NUCLEAR POWER PLANT went on line at Shippingport, Pa., at turn of year, signalling bright era for construction if cost and radioactive waste disposal problems can be bested.

. . . Refreshingly different water plant opens

plant complete with digester. Settling, filter and digester compartments are contained in one 11¾ ft dia, 20 ft high tank. Since sanitary engineers feel activated sludge plants require relatively skillful operation to compensate for their well-known sensitivity to varying flow conditions, the new trickling filter plant will be the subject of much interest.

• Spectacular construction—Some eye-opening outfall construction was on exhibit last year, featuring speed and thus low cost. In New Jersey's Raritan Bay, a 6,500 ft 84 in. dia corrugated metal outfall was payed off a floating rig at rates up to 240 ft a day. In the Pacific Ocean off Los Angeles' Hyperion plant, a 22 in. steel sludge outfall was pulled 7 miles out in just 7 days—in depths as great as 300 ft.

Aside from being daring and ingenious design and construction triumphs, these schemes presage an era of longer and longer outfalls, for effluent and sludge.

The year 1957 saw an intensification of efforts to meet the manifold industrial waste problem. And it also shed some light on how difficult the going will be. American Cyanamid's Bound Brook plant was one indication. But of broader import was a move by the Ohio River Valley Water Sanitation Commission to control salt content in the Ohio. Orsanco found it was dealing with a pollutant a) which had an economic effect (in industrial cooling and process water) before it became a public health hazard, b) whose effects (mainly corrosion) had not been evaluated by more than a handful of companies, c) which, because its concentration can be controlled only by dilution, required a unique basinwide concept to apportion the assimilative capacity of a stream, and d) whose regulation could have serious effect on the economic climate of the river basin.

While Orsanco is still wrestling with this specific problem, it has been recognized that some or all of the four complex characteristics of the Ohio River chloride question will be present in regulatory actions involving a host of industrial pollutants in river basins throughout the country. Pollution controllers and affected industries face realistic times ahead.

• Water supply quiet—Aside from the conjecture about booming water demands mentioned previously, water supply people found little new to get excited about in 1957. Some of them simply remained excited over the familiar themes of higher water rates and reimbursement for water line relocation due to highway construction.

The water rate, or "too-cheap water" battle was fought more energetically than usual last year, being joined by the Water Resources Council. This is a group, sparked by the sales know-how of the Water & Sewage Works Manufacturers Association, that aims to "reach" the public like it has never been reached before with the message of water supply men: It is too early to appraise these public relations efforts, but the water rate picture appeared to improve during 1957.

In consort with other utilities, American Water Works Association sections fought the relocation battle on a state by state basis against the highway departments. Reimbursement legislation was achieved in nine states, although in six others it failed only because of a governor's veto.

The generally lackluster year did produce three events of major significance, however: Opening of the most refreshingly different water treatment plant in years; successful performance of a radically new pipelaying machine; and the easy application of electronic computation to water distribution network analysis.

Oneonta, New York's new 4.5 mgd waterworks is already becoming a "must see" plant for water engineers. The design by Thomas M. Riddick of New York features six major innovations: 1) a chemical premixing tank that enables effective use of scarcely used calcite as an aid to alum coagulant; 2) recirculation of the effluent from the flocculation units to buildup the flow; 3) feed of rapid sand filters over weirs (of vinyl plastic) that assure uniform input to each filter; 4) filter effluent valves that are controlled by floats in the filters to match output to input regardless of head loss; 5) a special filtered water basin whose level, sensed by float, continuously maintains plant hydraulic balance; and 6) use of this basin to minimize filter wash water storage.

To lay 12 miles of very heavy concrete pipe on its $16 million Colorado River Aqueduct job, American Pipe and Construction Co. developed a self-propelled rig that snakes through a 16 ft section, picks it up and pushes it home. Known as the "Pipemobile", it was built specifically for the 13 and 13½ ft dia, 63 and 68 ton pipe being employed for the aqueduct. However, many who have seen the rig report smaller versions will assuredly pay off in laying much smaller pipe.

• Pushbutton engineering—Electronic computers to solve pipeline network problems were employed last year by a number of consultants using manufacturers' facilities and by a number of cities working directly with a data processing firm. The results in all cases were gratifying to the users. It is quite possible that this problem, which is similar in repetitive nature and drudgery characteristics to highway earthwork-volume calculations, will spark the widespread adoption of electronic computers in the water field, just as earthwork application did in the highway field.

During 1957 events of importance occurred concerning a number of noteworthy developments and trends:

• Fluoridation of public water received a boost when the American Medical Association re-approved its 1951 stand, this time in language that opponents could not claim was wishy-washy.

• A number of correlative studies comparing the new, simpler and faster membrane filter test for coliform bacteria with the standard most-probable-number technique brought closer the day of widespread use of the MF

to move an ocean–

by the bucketful is all right for this Sunday engineer, but for full time, 24-hour transfer of millions of gallons of water, rugged Peerless Hydro-Foil Pumps are the answer. Steam generation plants, sewage disposal plants, large irrigation and drainage projects, flood control stations and many other rigorous duties are being handled efficiently, dependably and economically by these giants of the pumping world. Available as either propeller type or mixed flow type, Peerless Hydro-Foil pumps have proved themselves to be the finest from every standpoint. For the big jobs, get the big pump, get the Peerless Hydro-Foil!

WRITE FOR ILLUSTRATED BULLETIN NO. B-148

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Peerless Pump Division

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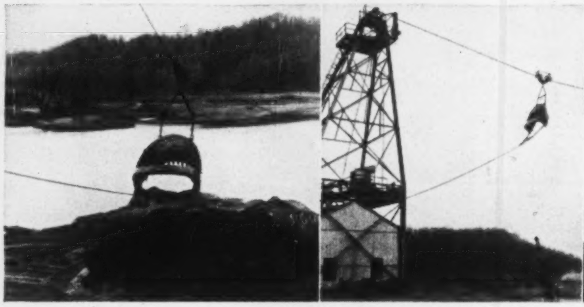
These Special Excavating Jobs Are Best Handled by Sauerman DragScrapers

Deep Digging

900-FT. SPAN—65 FT. BELOW WATER...



Load is deposited by tensioning the track cable, thus lifting the DragScraper from the pile. Tensioning continues to the desired height for releasing the DragScraper and returning it by gravity to the pit.

Operator controls digging and hauling from cab in head tower.

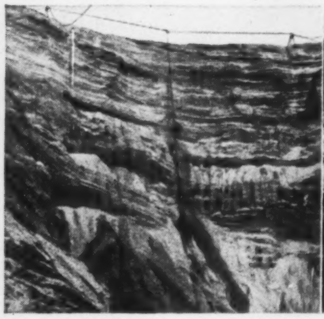
> **"the 10-yd. DragScraper is doing a wonderful job and we could not operate without it..."**
>
> *Louis Chinelli, Gen. Supt.*
> *Redman Concrete Corp.*

Redman had been trucking material at a cost of $35,000 a year to the location where the DragScraper is now placing it. The 10-yd. Sauerman covers a pond area of 1500′ by 3000′ and is digging 40 ft. deeper than their previous dragline could operate.

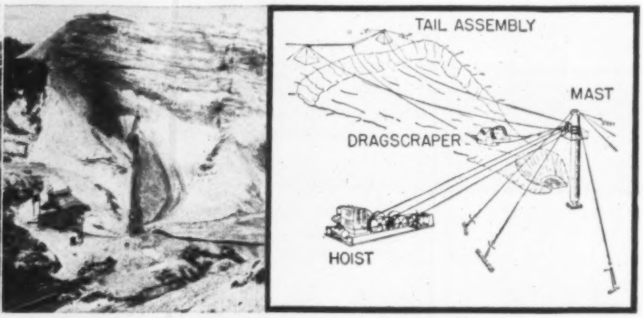
The DragScraper digs and hauls on a 900-ft. span. It operates between a 90-ft. fixed head tower and a 40-ft. mobile tail tower which may be shifted to change the line of operation. The company's 1000-yd.-per-day batch plants and its fleet of mixers and trucks are kept busy by the steady flow of material supplied by the DragScraper.

High Bank Digging

175 FT. HIGH—600-FT. HAUL...



DragScraper digs from high bank.



Overall view shows height and steepness of bank. Diagram shows details of Sauerman installation.

> **"I have nothing but praise for our 4-yd. Sauerman Machine. Since the DragScraper began operations in 1952, we have worked it continuously 12 hours a day..."**
>
> *John D. Robertson, Gen. Supt.*
> *Chandler's Palos Verdes*
> *Sand & Gravel Co.*

By working down from the top of the 175-ft. bank, the material flows ahead of the DragScraper. This provides bonus loads on each haul and substantially lessens the danger of cave-ins.

Operating cables are powered by a Sauerman three-drum electric hoist. Equipped for rapid shifting, the DragScraper can be quickly positioned to any line of operation between the two tail towers at the top of the bank and the headpost at the hopper.

The plant is the largest sand producer in the South Los Angeles area and, together with two ready-mix plants, keeps 22 ready-mix and 18 dump trucks busy.

The best Sauerman Machine for your plant is governed by the nature of the deposit, location of material, the depth and plant layout. Consult Sauerman engineers about your plant. Their recommendations will be based on fifty years of excavating machinery experience. Ask for Catalog A (DragScrapers). Sauerman News Nos. 149 and 150 describe the above installations in greater detail.

SAUERMAN BROS. INC. 632 SOUTH 28TH AVENUE • BELLWOOD, ILLINOIS

CRESCENT SCRAPERS • SLACKLINE and TAUTLINE CABLEWAYS • DUROLITE BLOCKS method. This time is still probably several years away, and is likely to be reached first in the sewage treatment field where exactitude is not as imperative as is the case in the water supply field.

- Adoption of automatic controls for telemetering and remote control of pumping systems continued at a good pace, but as to their use inside the treatment plant itself, water people in general needed to be convinced of their practicality.
- The roll-on ring joint for cast-iron water pipe grew more popular by the day.
- Rating of rapid sand filters (for hydraulic design purposes) continued their creep upward from the ultra conservative 2 gpm per sq ft of filter area to well past 3 gpm in a number of cases. One shrewd observer commented that filter ratings will be limited not by impairment of water quality, but by the economics associated with higher head losses.
- A number of cities, notably Chicago and Milwaukee, completed studies showing that non-conserved air conditioning cooling water was an extremely poor economic proposition for the water department. These cities, and others where rates were so low as to discourage conservation devices, were seeking permission to levy a "demand" charge on air conditioners—to encourage conservation equipment rather than to collect more money.

- **Nuclear power**—In previous years the effect of large scale nuclear power construction on hydroelectric development was much discussed (the consensus was it would augment, not depress, hydro activity). Last year the emphasis shifted to the waste disposal and water supply aspects of the water resources field as the first nuclear plant in the U.S.—at Shippingport, Pa.—went on the line.

Throughout the year, and particularly at the Nuclear Congress in Philadelphia where civil engineers played a prominent role, much was said about the needs to engineer a satisfactory disposal method for radioactive wastes and to maintain a careful check on radioactivity in the nation's rivers. On the water supply side, it was brought out that nuclear plants require mineral-free process and cooling water to minimize the radiation hazard.

It became apparent that nuclear power will have an exceedingly close relationship with the nation's water resource development in all its varied forms. Conversely, in view of the unity theme of this review and forecast, it is interesting to consider how the attention of water specialists of all types will be focused on nuclear power. The potential fruits of coordinated thinking are obvious.

Major River Use and Control Projects

Projects are grouped by major drainage basins, or groups of basins, as shown on map at right.

1 Columbia River and North Pacific basins

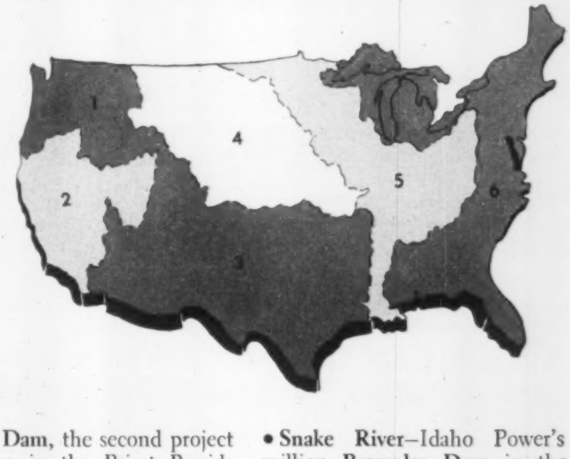
2 Central Valley, South Pacific and Great basins

3 Colorado River, Rio Grande and Gulf, Arkansas River, White River and Red River basins

4 Missouri River basin

5 Mississippi River, Ohio River and Tennessee River valleys

6 Great Lakes, St. Lawrence River, Atlantic and Eastern Gulf drainage areas



I Columbia and North Pacific Basins

- **Columbia River**—Power from two main 78,000 kw generating units is flowing into the Northwest power pool from the $260 million **The Dalles Dam.** Listed as 85% complete by the Corps of Engineers, the project is scheduled for completion in 1960.

Priest Rapids Dam—Work on the main $92 million dam and powerhouse contract was one-third complete at the end of 1957. Grant County PUD officials expect that in the latter part of 1958 work on the powerhouse will be completed to the point where installation of turbines and generators will be started. A nameplate capacity of 796,000 kw will be installed. The earthfill embankments will be substantially completed in 1958. A site has been selected for **Wanapum Dam,** the second project the PUD plans in the Priest Rapids stretch of the river.

Rocky Reach Dam—Work was virtually completed on the first $25 million phase of Rocky Reach Dam on the Columbia River for the Chelan County PUD of Wenatchee, Wash., and a $52.4 million contract was awarded Oct. 25 for the final stage. The $245 million project, with a rated capacity of 710,000 kw, is scheduled for completion in 1962.

Chief Joseph Dam—Energizing of five 64,000 kw units during the year brought this Corps of Engineers Columbia River project to 95% of completion. The remaining four units to make up the 16 scheduled for the $200 million project are to be installed by December, 1958.

- **Snake River**—Idaho Power's $63.5 million **Brownlee Dam** in the Hell's Canyon area of the Snake River is 75% complete. Downstream section of the rockfill dam has been topped out and the entire embankment will be finished by spring. Project due for full completion by end of 1958 with first of four 90,100 kw generators due to produce in October. Meanwhile, work is getting under way on the $23.6 million **Oxbow** project just downstream.

Ice Harbor Dam—Work is on schedule and 18% complete here. The south shore abutment and the non-overflow section have been brought up almost to dam crest level. Initial capacity will be 270,000 kw. Bids are scheduled to be called this year for work behind the Stage 2 cofferdam which includes a record size 103 ft lift chamber.

PRIEST RAPIDS dam and powerhouse on the Columbia River was one-third finished at year's end. Shown are power plant and spillway sections on the left bank.

Palisades Dam—The $62 million earthfill dam project on the Snake River in eastern Idaho will be fully complete this year. Last of four generators was put on the line early this year with capacity now 114,000 kw. Bureau of Reclamation hopes to complete filling the 1.4 million acre-ft reservoir this spring.

- **Clark Fork River**—Work on the $87 million, 400,000 kw initial capacity **Noxon Rapids Dam** of the Washington Water Power Co. continues with completion of 2 years of a 4 year construction schedule. The structure has a concrete powerhouse and spillway section with flanking earthfill embankments.

- **Lewis River**—Pacific Power & Light Co.'s **Swift Dam** project was 50% complete at year's end with more than 7.6 million cu yd of fill material in place for the 512 ft dam which will be the world's highest earthfill dam. A 25 ft dia 1,575 ft tunnel is well along and spillway excavation was near completion. The $51 million project is teamed with a $17 million project of the Cowlitz County PUD 3 miles downstream to develop a total of 256,000 kw of capability. Construction of both powerhouses is under way.

- **Cowlitz River**—Long hampered by litigation, work on the **Mayfield Dam** of Tacoma, Wash., City Light was brought to a complete halt early in the year.

- **Willamette River Basin**—The Corps of Engineers $34.5 million **Hills Creek** dam on the Middle Fork in Oregon reached the 16% mark. Filling of the reservoir is scheduled for October, 1960, and all 30,000 kw of power should be on the line in November, 1961.

Cougar Dam, a Corps project on the South Fork of the McKenzie River, is about 10% complete. Bid call for the 445 ft high rockfill dam, outlet and power intake works is scheduled for March with bids to be opened in May. The $37.4 million project, with 25,000 kw capability, is scheduled for completion in November, 1961.

The Portland District of the Corps has completed a site selection report for **Green Peter Dam** on the Santiam River, a $58.4 million project, and plans a concrete gravity dam. Exploration drilling was accomplished at the **Holly** dam site, a $12.5 million project on the Calapooya River.

- **Deschutes River**—With the first of its three 40,000 kw generators on the line, Portland General Electric's **Pelton Dam** project in Oregon was 82% complete at year's end. Installation of No. 2 and No. 3 generating units was proceeding rapidly and full operation is scheduled for the end of March, 1958.

- **Columbia Basin Irrigation**—With half of the $15.4 million fiscal 1958 allocation spent the Columbia Basin project is now 68% complete. Irrigation water is available to 349,000 acres. Another 34,000 acres will be added during calendar 1958. A total of 1,029,000 acres was originally planned in the basin project. Work is now under way on the following projects: Wahluke siphon, Frenchman Springs pumping plant, laterals in blocks 79 and 20, two contracts for enlarging the Potholes East canal.

- **Upper Baker River**—Placement of concrete began late in the year for Puget Sound Power & Light Co.'s new hydroelectric dam on the Upper Baker River near Concrete, Wash., estimated to cost a total of $35 million. The project, to increase the capacity of a downstream plant, is due for completion in late 1958.

- **Skagit River**—Excavation for the $17 million **Gorge High Dam** of Seattle, Wash., City Light had to be halted when an ice barrier failed to stop the flow of upstream ground water. At year's end, the ice barrier was being strengthened to the point where it was hoped excavation could proceed soon.

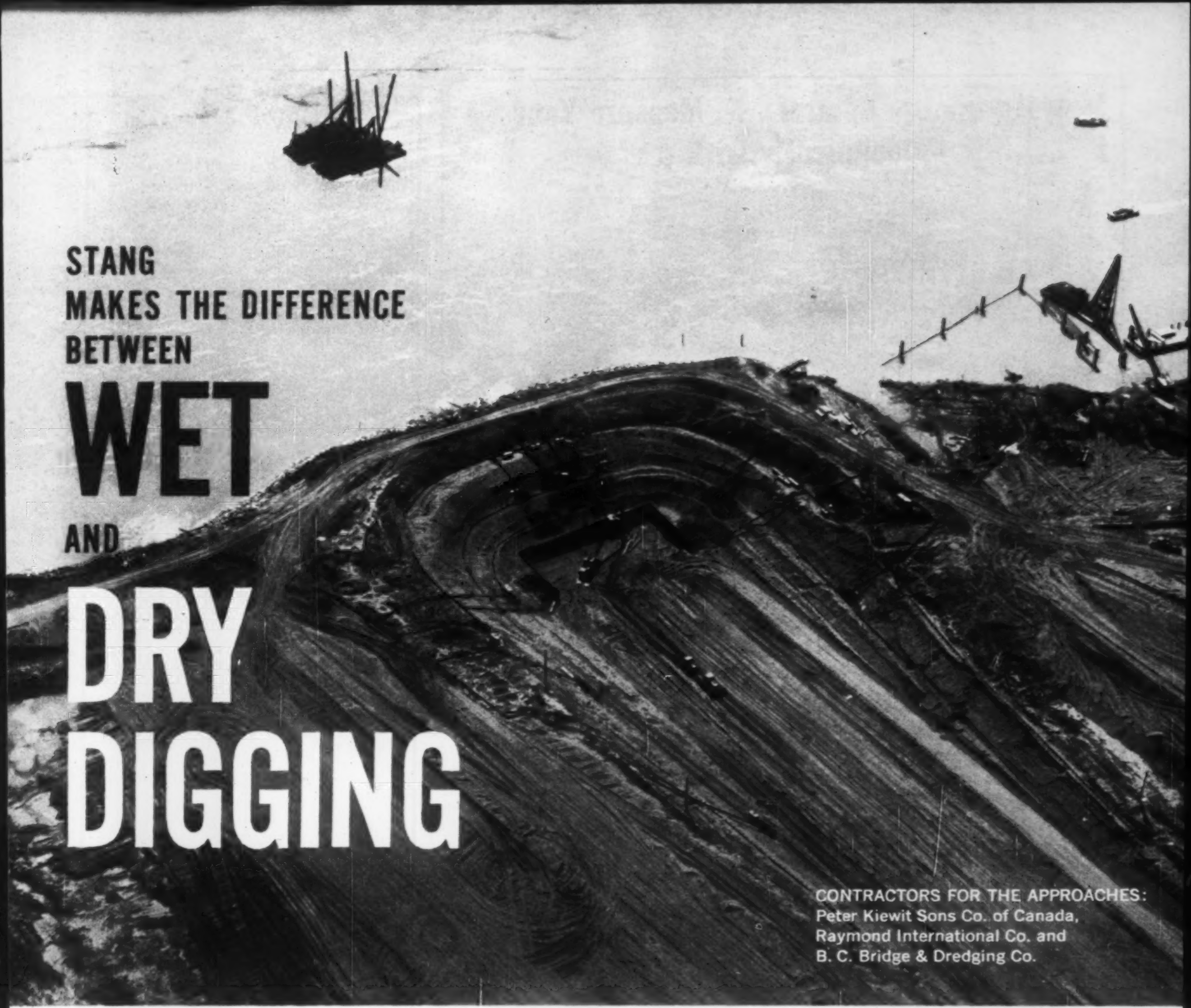
II Central Valley and South Pacific Basins

- **Northern California Flood Control**—During the year the Sacramento District, Corps of Engineers, opened bids on the main contract for construction of the $14 million **Success Dam** on the Tule River but the bids were rejected when Congress failed to act on an omnibus bill authorizing the work. The Corps also is ready to ask for bids on the $21 million **Terminus Dam** on the Kaweah River in San Joaquin Valley.

- **Los Angeles Flood Control**—The storm drain program of the Los Angeles County Flood Control District moved ahead during 1957 with work on $61 million of projects. So far, upwards of $100 million has been committed or expended on storm drains since the program began in 1953. Biggest single project that got started in 1957 was the $8 million Slauson Avenue relief drain. Reported ready for advertising is Unit No. 2 of the East Compton Creek Drain at a bond issue cost of $4.5 million, also 23 other jobs to cost about $30 million. The remaining 36 contracts, totaling $62 million will be advertised in 1959.

Meanwhile, the U. S. Corps of Engineers has completed about 86% of a Los Angeles County project calling for five major reservoirs and about 275 mi of channel improvement at a total estimated cost to the federal government of $370 million.

(*Continued on page 220*)



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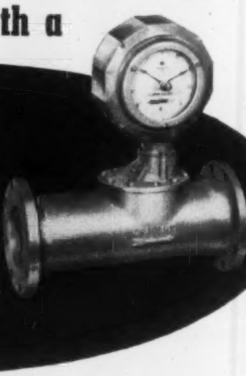

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River Use and Control

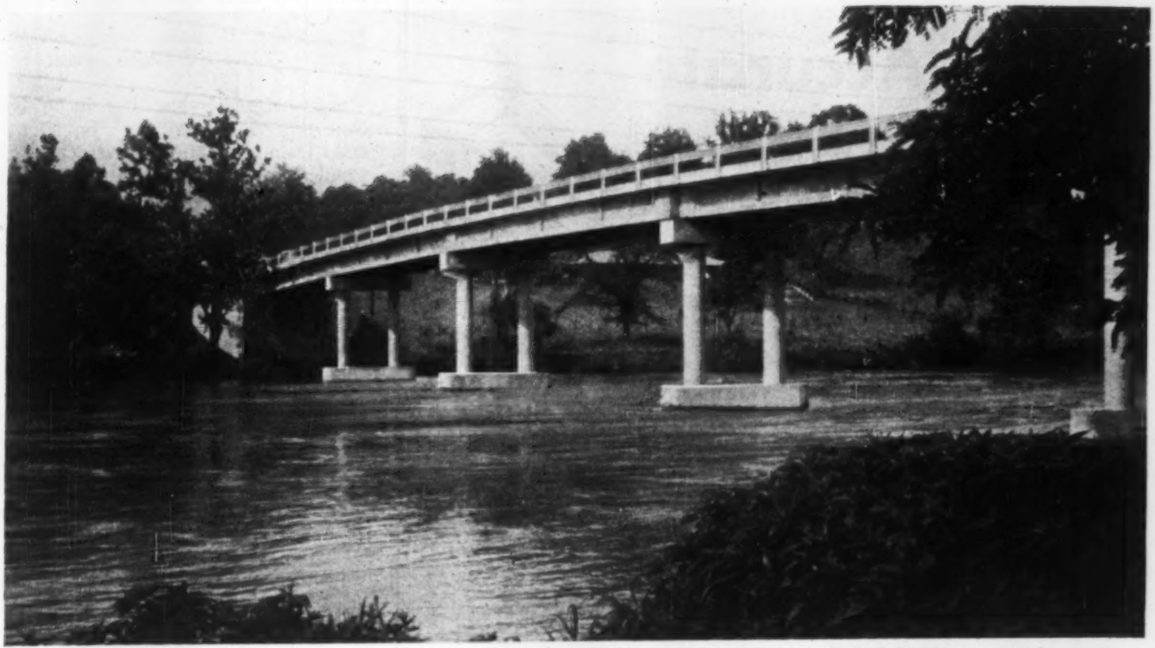
• **California Water Plan**—The state legislature appropriated $25 million for the **Feather River Project** and all this sum has been contracted for highway and railroad relocation, necessary before work can begin on the $400 million **Oroville Dam** in the Sierra Nevada foothills in northern California. The 1958 legislature will be asked for $44 million to complete the relocation work and for rights of way at Oroville reservoir. The Department of Water Resources also hopes to get $17 million for work on **Frenchman Dam** in the upper Feather River Basin, **South Bay Aqueduct** which would take water from the Sacramento Delta into the Santa Clara Valley and **North Bay Aqueduct** which would carry water to areas of need in the counties north of San Francisco Bay.

• **American River**—Ground was broken late in 1957 at Sacramento Municipal Utility District's water and power project on the upper reaches. This spring construction is expected to start on **Ice House Dam,** one of the 10 dams and reservoirs in the system, having a total storage capacity of 287,600 acre-ft and 23 mi of tunnels. The development will have an installed capacity of 206,000 kw of power, generated in four power plants. Ice House Dam will be a 175 ft earthfill structure. Voters of the SMUD region approved an $85 million revenue bond proposal to finance the project.

• **Trinity River Project**—During 1957 work was started on the $49 million **Trinity Dam,** largest dam project now under way in California. Another phase of the USBR's **Trinity River Project** unit gotten under way is the 10.8 mi $36.6 million **Clear Creek Tunnel,** 17.5 ft in dia. Trinity Dam will be an earth and rockfill structure 465 ft high, with a crest length of 2,450 ft and will contain 33 million cu yd of material. Powerplants on the Trinity Project will have a capacity of 369,000 kw but still to be decided by Congress is whether the Bureau of Reclamation will build the power facilities or a partnership plan by the Pacific Gas & Electric Co. to install the power plants and buy "falling" water from the government is accepted.

• **Central Valley project**—Some work proceeded on the **Corning Canal,** a unit of the USBR's $55 million **Sacramento Valley Canals System.** However, a stalemate over signing of repayment contracts with water users delayed a start on the Red Bluff diversion dam on the Sacramento River, a necessary facility to begin water deliveries. Starts

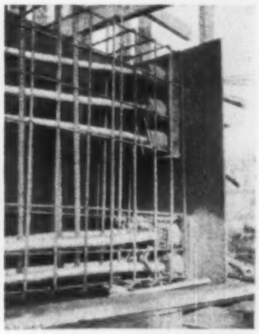
(*Continued on page 222*)



South Fork Bridge over South Fork of Holston River, Kingsport, Tenn. Owner: Ridgefields, Incorporated. Contractor: Blount Bros. Construction Company, Montgomery, Ala. Consulting Engineer: Mr. H. T. Spoden.

450-Ft. Prestressed Concrete Vehicular Bridge Uses 53 Miles of Roebling Prestressing Wire

Grouting 90-foot girders.



Detail of end reinforcement cage, Freyssinet end anchorages, metal sheath and Roebling wire—90-foot girder.

Spanning the South Fork of the Holston River at Kingsport, Tennessee, this new bridge embodies the Freyssinet cable method of prestressing. These Freyssinet cables—as well as end anchorages, sleeves, grids, and jacking and grouting equipment—were supplied by the Intercontinental Equipment Company, Inc.

Span lengths are 85, 90, 100, 90 and 85 feet, for a total length of 450 feet. Roadway width is 20 feet between curbs. Prestressing units consist of 8 cables of 18 wires each in the 100-foot span, and 7 cables of 18 wires each in the 85- and 90-foot spans. Wire diameter is 0.196 inches.

Roebling is now equipped to deliver cable assemblies composed of a specified number of wires cut to the required length and assembled in flexible metal hose ready for placement in the forms of post-tensioned members.

This facility is, of course, in addition to the standard 7-wire, stress-relieved strand for pre-tensioned bonded prestressed concrete and galvanized strand assemblies for structures where design loads are heavy or require long tensioning elements, and stress-relieved wire for all types of parallel wire cables for post-tensioning.

Further, Roebling is always ready to furnish you with information and assistance on *any* phase of this remarkable and widely growing construction method. By writing to Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, you can avail yourself of prestressed concrete information on whatever aspect most concerns you.

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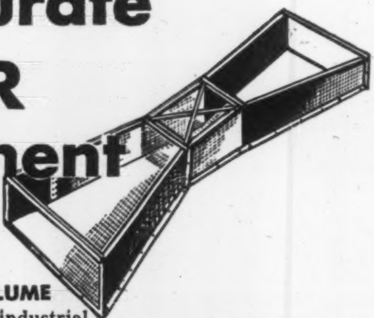

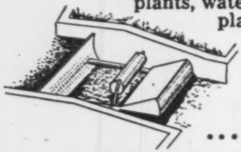

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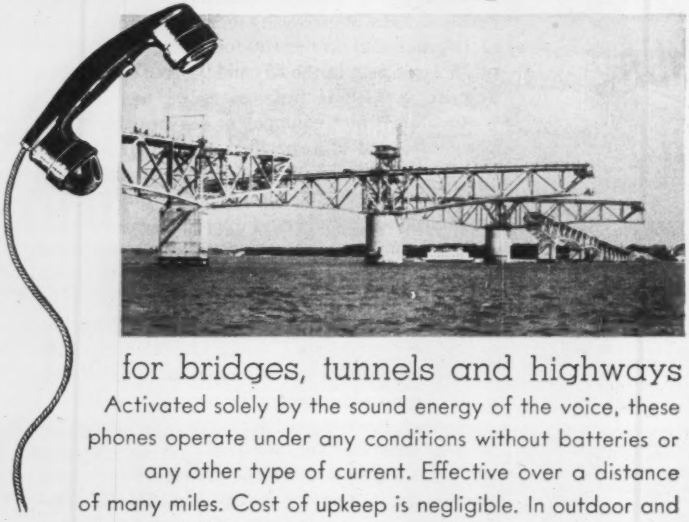

have not been made, either, on the Tehama-Colusa and Chico canals.

• **Solano Project**—The Bureau of Reclamation completed work on **Monticello Dam,** a $22 million structure on Putah Creek in Northern California and key structure of the Solano Project, which is designed to provide water needs to communities and farmlands north of the San Francisco Bay area.

• **Ventura Project**—Favorable construction conditions enabled a rapid advancement of **Casistas Dam,** $8.6 million key unit of the USBR's project to deliver water to the fast growing Ventura County in the southern part of California. At year's end Casistas was 55% completed, while the $11.5 million pipelines system from Casitas was 25% finished.

• **Feather River**—Pacific Gas & Electric Co's $38 million **Poe** project on the North Fork in Northern California will be finshed in 1958. The diversion dam, a 6½ mi, 24 ft dia tunnel, and a 106,000 kw power house are 80% complete. On the upper Feather River, PG&E is working on construction projects costing $2.6 million. **Caribou No. 2** powerhouse, 109,000 kw, is 40% complete, and the 36,000 kw **Butt Valley** plant is 35% complete.

• **Kings River**—At Pacific Gas & Electric Co.'s $76.5 million development on the Kings River in central California, **Courtright Dam** was 63% complete and **Wishon Dam** was 93% complete when work shut down for the winter. The Kings River development, which will add 261,500 Kw to PG&E's generating capacity, also includes construction of **Haas** and **Kings River** powerhouses, and enlargement of **Balch** diversion dam and powerhouse. Work on the underground Haas project is 50% complete. Balch and Haas powerhouses and the two dams will be finished in 1958. The Kings powerhouse not yet started, is scheduled for completion in 1961.

• **Tri-Dam Project**—This $52 million joint development of the Oakdale Irrigation District and the South San Joaquin Irrigation District on California's Stanislaus River was practically finished in 1957, almost a year ahead of schedule. The upper works consists of **Donnells Dam,** tunnel, and power plant; and **Beardsley Dam,** power plant, and afterbay. Donnells is a concrete arch dam 960 ft long and 290 ft high, while Beardsley, 12 mi down river, is a 280 ft high 3 million cu yd earthfill. In the lower works, pouring of concrete for **Tulloch Dam,** which is concrete gravity,

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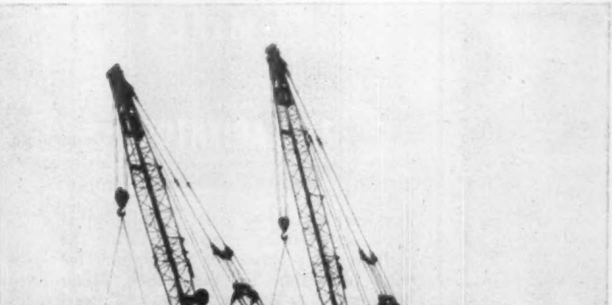

Two Lima Type 54-T truck cranes, equipped with 40′ and 50′ booms, setting 31-ton, 50,000 gallon capacity tank.

Lima Type 44-T Truck Crane pouring concrete into bridge pier form on the West Coast's largest freeway at Oakland, California.

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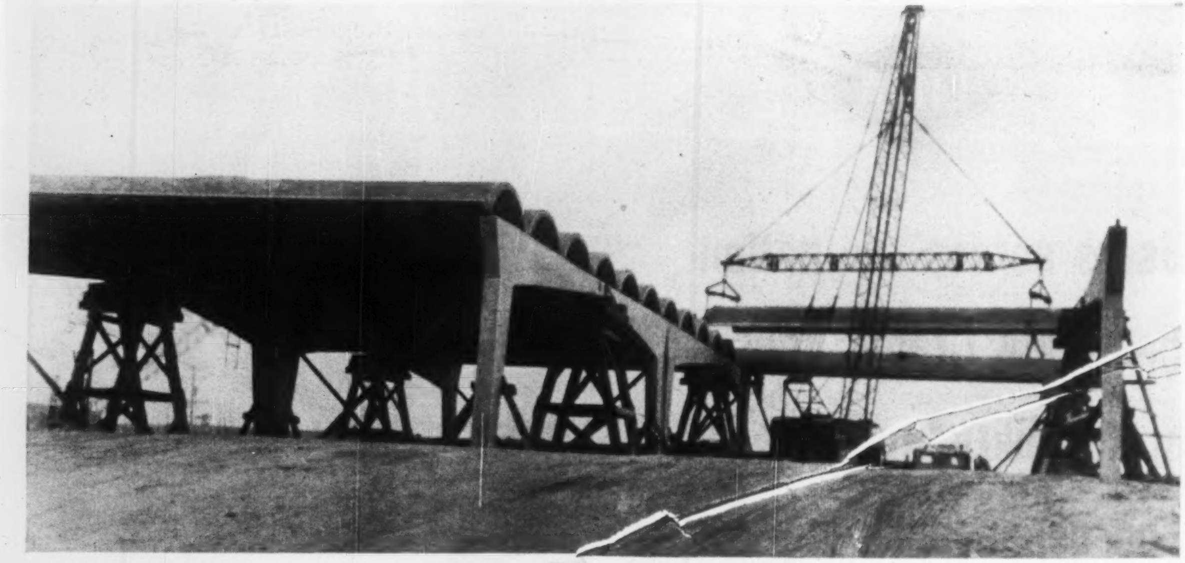


3 PAIRS OF PRECAST BENTS support roof arches for Westmoor High School gymnasium, Daly City, California. Middle pair divides 104' width of 180' long structure into separate gyms for boys and girls.

Mario Ciampi, architect; Isadore Thompson, structural engineer; Theo. G. Meyer & Sons, general contractor, all are in San Francisco. Kelley Bros., San Jose, erection contractor.

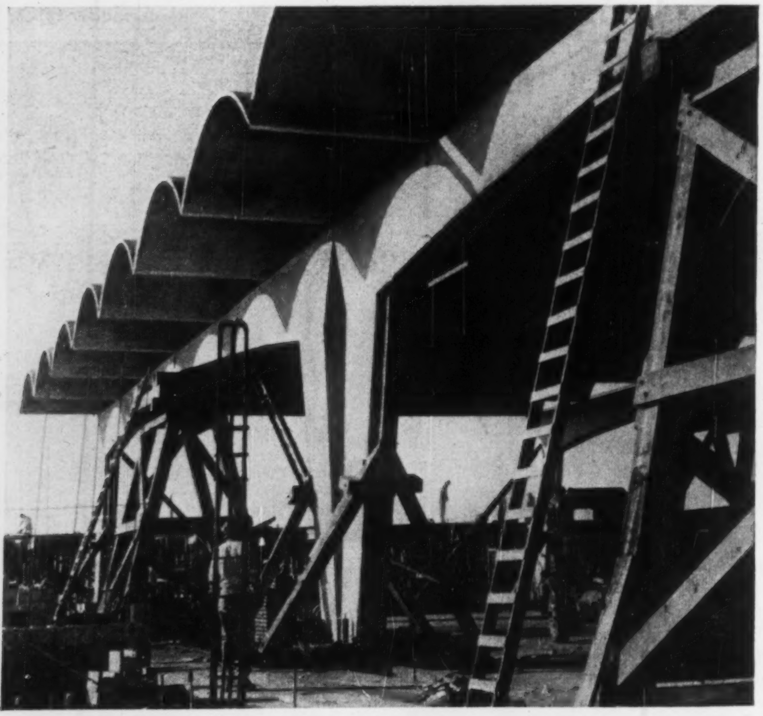
Precast roof arches span 52' without in-place forms

PIONEERING a recent design concept, precast thin-shell concrete arches, spanning 52' between bents, form a low-cost roof for this school gymnasium. The barrel arches, 61' long, including a 9' cantilever overhang, and 15' wide with a 3½' rise, are only 3½" thick. Each of the arches weighs 20 tons.

It took less than an hour for a motor crane to install each arch on precast 90'-span supporting bents. Precasting of bents and roof arches eliminated forming a concrete space frame 22' above floor level which would have more than doubled the cost. A real saving.

In-place structural framing costs ($1.37 per sq. ft. for roof shells and $0.81 for bents) averaged out at $2.18 per sq. ft. for the 90'x50' column spacing.

Precasting the 24 roof arches was handled nicely by a line of forms which produced 6 arches at a time. Six arches were poured in less than 4 hours using lightweight 3000 psi concrete, properly processed in uniform batches by truck mixers of certified design, capacity, mixing speed and water control accuracy.



TIMBER FALSEWORK TOWERS temporarily supported bents at center of 90' span until entire roof load was applied. There are two rows of 12 arches each in the roof.

NATIONAL READY MIXED NRMCA CONCRETE ASSOCIATION
6 CUBIC YARD
MIXER
MAXIMUM CAPACITY
CERTIFIED BY THE TRUCK MIXER MANUFACTURERS BUREAU TO COMPLY WITH ITS STANDARDS FOR TRUCK MIXERS AND AGITATORS AS APPROVED BY THE N.R.M.C.A.
7 3/4 CUBIC YARD AGITATOR
UNLESS RATED LOWER ON THE MANUFACTURER'S DATA PLATE
N.R.M.C.A. REGISTRY NO.

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Plainfield, N. J.

River Use

is complete. Power generating equipment is in place and will start operating in February, 1958.

III Colorado, Gulf, Arkansas, White and Red Basins

- **Upper Colorado River Project**—In 1957 Merritt-Chapman & Scott Corp. of New York was awarded the prime contract for $108 million for construction of **Glen Canyon Dam,** major element of the USBR Upper Colorado River project. Some 1,000 men are now employed at the project. An earlier contractor holed through the right diversion tunnel in November. MC&S has started powerhouse service road tunnel (18,930 ft), spillway excavation on each canyon rim and suspension footbridge across the canyon. Bridge abutments and footings for the $4.1 million, 1,271 ft steel arch bridge across the Colorado below the dam have been completed.

- **Arkansas River**—Important construction was carried out on the $1.1 billion multipurpose development of **Arkansas River basin.**

Oologah Dam on the Verdigris River is 14% complete. The 4,100 ft long earthfill of 129 ft height will cost about $31 million.

Eufaula Dam, a $154 million project on the Canadian River, is less than 5% complete. It is to be a 3,180 ft long, 111 ft high compacted earthfill with concrete spillway and powerhouse sections.

Keystone Dam on the main stem of the Arkansas River is also in the early stages of construction. The $137 million project includes a 4,570 ft long 121 ft high compacted earthfill and concrete spillway sections.

Dardanelle Dam also on the main stem of the Arkansas, is less than 5% complete. The $95 million project, including a 2,570 ft long by 70 ft high concrete dam with powerhouse and navigation locks, will contain 250,000 cu yd of concrete.

The $19 million **Wichita (Kan.) flood protection project** is now 90% complete.

- **White River—Table Rock Dam** on the White River in southern Missouri is essentially complete and work is under way on the powerhouse. A total of 4.6 million cu yd of concrete is contained in the concrete section of the dam and embankment extensions. The $70 million project is 60% finished.

The $52 million flood control and hydropower **Greer's Ferry Dam** on the Little Red River in Arkansas, tributary of the White is less than 5% complete.

- **Other Southwest projects**—Detailed

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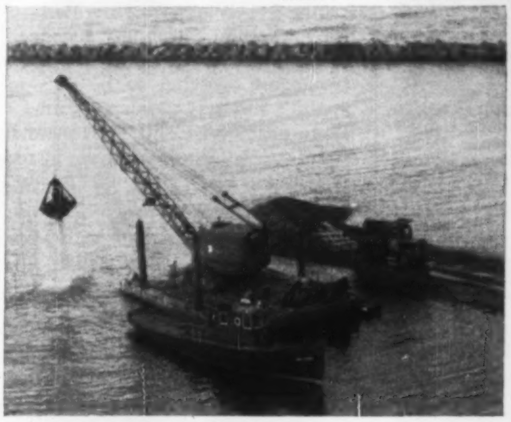
SECTIONAL BARGES

- For floating all sizes of lift cranes, clams, draglines and other contractors' equipment.
- Easily assembled or knocked down for moving by rail or highway.
- Sections can be assembled into numerous barge sizes.
- Spuds, deck fittings, loading ramps and other accessories available.

Photo to the right illustrates the drill barge HORNET IV used in the Amherstburg Channel deepening project by contractors Marine Operators of Windsor. This 20 drill rig including compressors and diesels is mounted on a 160' x 30' sectional barge made up of 11 sections. 40 foot spuds are used to position the barge.



A clam operation off the rock bound shore of Lake Superior. The crane is mounted on a 4 section barge which was transported by highway to the site.

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The Manitowoc Porta-Float is the smaller version of the sectional barge. The standard basic float is 32' x 8' x 4'. Units can be pinned together to make a wide variety of sizes and arrangements. Economical and versatile for floating all types of contractors' equipment. Ideal for floating docks, piers, etc. Porta-Floats are easily transported on trucks as illustrated below.

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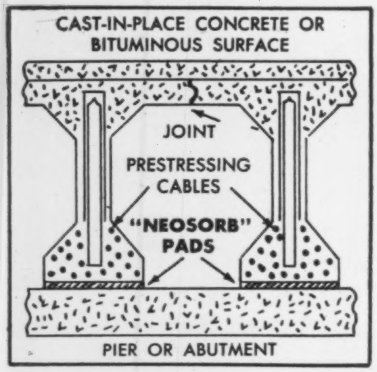

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Special composition, specially cured Neoprene Bearing Pads are rapidly being adopted by state highway departments for bridge and overpass construction. With either prestressed concrete or steel beams, VOSS "NEOSORB" Bearing Pads offer distinct advantages over older approaches to the bearing problem; they replace mechanical bearings, give full-beam conformation, prevent electrolysis when used under aluminum railings.

They meet such requirements for an acceptable beam bearing as: (1) uniform transfer of load from beam to substructure; (2) accomodation to deflection of beam under load by beam rotation at the bearing; (3) allowance for changes due to temperature variation and shrinkage, by permitting lateral and longitudinal movement of the beam; (4) reduction or elimination of maintenance; (5) durability, including resistance to ozone deterioration during aging. And of course, they cost *considerably* less than most metal or combination bearings.

• Voss "NEOSORB" Bearing Pads are made of the finest materials, to the controlled formulae required for heavy-duty construction use, and supplied to exact dimensional specifications according to existing state standards. If and when new standard specifications to be applied nationally (now under consideration by AASHO) are adopted, Voss will immediately begin production of "NEOSORB" Bearing Pads to the new specs. If you are on our mailing list, you will get "flash" information about any such adoption of new standards.

*Call on Voss for any information or assistance you need regarding Bearing Pads and Preformed Fabric Pads for beam seating, vibration and shock damping, etc., in any construction application. You can be sure of our closest cooperation.

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engineering work is under way on $15 million **Canyon Dam** on the Guadalupe River in south central Texas. Another big project just getting under way is the $53 million **McGee Bend Dam** on the Angelina River in east Texas. The dam will be 120 ft high, 11,300 ft long and will form a 4 million acre-ft reservoir. It is 5% complete.

The **Buffalo Bayou (Texas)** flood protection project for the metropolitan Houston area, a $91 million project, is about 30% complete. A total of $63 million has also been spent to date in the Southwestern Division in the Corps of Engineers program of deepening seven principal entrance channels at Galveston, Houston, Texas City, Brownsville and other points along the Gulf. The total project will cost about $115 million.

• **Reclamation Regions**—Construction on the **Middle Rio Grande** project at Albuquerque last year was centered on canals, laterals and channelization work. About 14 major contracts for this type of work, expected to cost $4.4 million, are programmed for 1958. The $24 million project is 70% finished.

The $41 million **Washita Basin** project in western Oklahoma is scheduled for completion in 1962. It includes two dams expected to be put under contract this year. They are **Fort Cobb Dam**, near Fort Cobb, Okla., and **Foss Dam** on the Washita River, just west of Clinton, Okla.

IV Missouri Basin

• **Missouri River Basin**—Based on expenditures through 1957, the Corps' authorized Missouri Basin construction program had reached 49% completion at year's end. The overall program will cost about $2.4 billion. A substantial step-up in construction contract awards this year is scheduled for the Missouri Basin, subject to current budgetary reviews. During 1958, $27.5 million worth of construction is expected to be awarded in the Garrison District; $55 million worth of work in the Kansas City District and $50 million in the Omaha District, for a total of $132.5 million. By comparison, $72.7 million worth of work was placed under contract in the three districts during 1957.

Garrison Dam's major development last year was the award of key contracts for generators, penstocks and surge tanks for the fourth and fifth power units. The first three units, each 80,000 kw, are completed and producing power.

Fort Peck Dam saw start, last summer of construction of its second power plant, estimated to cost $27 million. Its completion, in 1961, will bring the total installed capacity at Fort Peck to 165,000 kw.

OLD HICKORY Lock and Dam on the Cumberland will be completed in 1958.

Gavins Point Dam was dedicated last August following the placing in service of the third and final hydropower generator. Total installed capacity is 100,000 kw.

Oahe Dam, world's second largest earth dam, advanced from 18 to 26% completed during last year. Facilities built included the six flood control tunnels located in the abutment on the west side of the Missouri River; concrete stilling basin; Stage 5 earthwork, involving about 15 million cu yd of earth. Total volume in the embankment at the close of last year was about 64 million cu yd. Award of the Stage 6 earthwork contract, which calls for excavation of 24.4 million cu yd was made late in 1957. This contract will close the dam and complete excavation for the spillway. Closure is expected to be made this summer.

Big Bend Dam, last of the six authorized mainstem dams on the Missouri, is not yet under construction; site studies were completed last year.

Tuttle Creek Dam on the Big Blue River in Kansas, which is the key dam for flood control in the Kansas River Basin was advanced to 23% completion by the end of 1957. A contract for completion of the earth dam and spillway excavation is expected to be awarded early in 1958. Other scheduled 1958 contracts will include highway and railroad relocations, and continued land acquisition.

Pommede Terre Dam in Missouri has a major contract for construction of the outlet works and spillway scheduled to be let early in 1958. The first contract for work on the outlet works and excavation of the embankment fill was 93% completed at the end of 1957.

At the end of 1957 the authorized 9 ft **channel and bank stabilization** project on the Missouri River was 85% completed from Sioux City, Iowa, to the river's mouth, a distance of 760 river miles. A total of 20 new contracts was awarded during the year. Channel improvements completed, in combina-

RAIN

Near Massacre Rock — scene of immigrant wagon-train tragedy in 1862 — C Rear-Dump spills heavy 11-yard rock load on the fill. Hauler has positive "up", positive "down" dumping action... cleanly dumps load well behind wheels... minimizes clean-up on banks, at grizzly, etc.

didn't stop this job at Massacre Rock!

How often does an hour or so of rain stop your haulers... halt earthmoving while costs continue until end of the day? When you're operating several units, just a few non-productive hours "now and then" can soon add-up to the difference between profit and loss on your contract.

Work thru rain and muck

Duff Reed Construction Co., Twin Falls, Idaho, used Elle Construction Co.'s two 22-ton C Tournapull® Rear-Dumps on a grading job near Massacre Rock. Loaded by a 2½-yd. shovel, big haulers moved 80,000 yards of rock over dirt roads on rebuilding 8.2 miles of U.S. 30N, west of American Falls, in southeastern Idaho.

Rain fell during the afternoon, as Rear-Dumps hauled fill for the new roadbed... cleaning-up a rock cut 380′ long, 68′ wide, and 22′ deep. The dirt haul road became slick, and got progressively worse as the rain increased. Yet, C Rear-Dumps kept rolling steadily, hauling heavy 11-yd. payloads. Tournapull haulers covered the 2700′ route — load, haul, dump, and return — in an average of 7.3 minutes. In spite of rain, dumpers worked straight thru until 4:30 quitting time.

Good mudders

LeTourneau-Westinghouse Rear-Dumps are specially engineered to work steadily in mud, sand, soft fills and other slippery or unstable footing. Exclusive Tournapull power-transfer differential always keeps most pull-power on drive-wheel with best traction... maintains essential momentum and power... keeps loaded unit rolling where other haulers can't go. Big, low-pressure tires get firm "grip", spread weight for heavy pulling without sinking-in. And with geared electric power-steer on kingpin, prime-mover can be swung alternately 90° left and right, to "walk" load out of bog-down footing.

"In and away from shovel, fast"

Says Tex Henry, Superintendent for Elle Construction Co., "These Tournapulls get in and away from the shovel so fast, that there's no comparing them with other rigs. Their high haul speed and fast maneuverability make them ideal for us. We're also getting two 18-yd. scrapers to interchange with Rear-Dumps on these prime-movers."

To reduce per-hour ownership costs, and increase profit, your same "C" prime-mover can operate: bottom-dump, side-dump, scraper, lift-and-carry crane, or flatbed. Each added trail-unit costs only about 25% of the original investment... changeover takes only a few hours. Optional trail units also available for 35-ton "B" and 11-ton "D" sizes. Call or write us.

Elle Construction Co.'s 22-ton C Tournapull Rear-Dumps haul steadily from rock cut... thru afternoon rain that made dirt haul roads soft and slippery... on 8.2-mile Duff Reed Construction Co. project, near American Falls, Idaho.

CR-1565-DCJ-1

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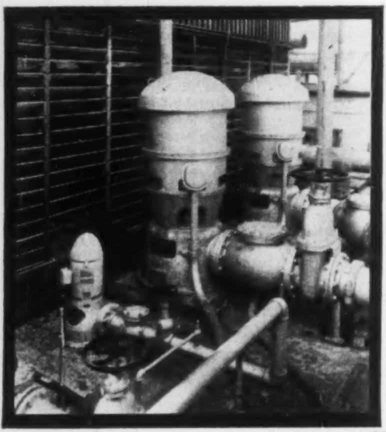

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Here's proof of Johnston's superiority—an evaluation of bids made recently by Johnston and five other prominent manufacturers of vertical pumps.

Mfg.	Est. Power Cost	Over-all Efficiency	Total Cost (incl. power)
Johnston	$88,748	.7863	$108,731
Co. B	90,183	.7724	109,253
Co. C	91,883	.7585	110,460
Co. D	93,477	.7493	112,548
Co. E	93,621	.7406	112,719
Co. F	92,967	.7520	112,966

All size verticals: 4 to 30 inches; 1½ to 1000 hp; 25 to 10,000 gpm.

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tion with flow regulation from upstream reservoirs, now provide satisfactory navigation depths for commercial navigation on the river from Omaha to the mouth. Current depths available are 6½ ft from Omaha to Kansas City, and 7 ft from Kansas City to the mouth.

• **Reclamation Region 6**—The most active project last year in the Bureau of Reclamation's Region 6, with headquarters at Billings, Mont., was the **Helena Valley** unit, on which work was started in December 1956. The project includes a pumping plant, a 2.8 mi horseshoe tunnel, the Helena Valley dam and reservoir which is a 2,600 ft long, 73 ft high rolled earthfill, 34 mi of canal and a lateral system to serve 12,500 acres.

In Wyoming, a $2.3 million contract was awarded by USBR last spring for construction of **Anchor Dam** on the south fork of Owl Creek, near Thermopolis. It will be an arch type dam, 550 ft long and 200 ft above streambed.

• **Reclamation Region 7**—The Bureau of Reclamation's Region 7, with headquarters in Denver, Colo., expects to spend $36.5 million in its construction and rehabilitation program during fiscal year 1958, compared with $22 million for fiscal 1957. Construction of the $159 million **Colorado-Big Thompson Project** is virtually complete in the South Platte Basin and the **Frying Pan-Arkansas Project** is pending before Congress for authorization.

All major construction contracts have been awarded on the **Glendo Dam** and power plant, located on the North Platte River in Wyoming, and the $44 million project is expected to be about 70% finished by June of this year.

The $51 million **Bostwick Division** in Nebraska and Kansas, to provide irrigation, regulation of stream runoff and flood control in the lower Republican and Kansas River basins, will be 70% completed by June. Completion date will be some time after the end of fiscal 1964, at which time irrigation will be provided for 86,240 acres of rich bottom lands.

The **Frenchman-Cambridge** division in Nebraska, with its four dams, Trenton, Enders, Medicine Creek and Red Willow, will be 74% finished by June of this year. The $78.7 million irrigation and flood control project will have a total storage of 507,000 acre-ft. **Kirwin Dam** and reservoir, together with irrigation facilities for 11,500 acres in north central Kansas will be completed this year at a total project cost of $20 million.

(*Continued on page 230*)

Builds mile-long berm for concrete irrigation ditch at Arizona ranch

Completed concrete-lined irrigation ditch — like that under construction at Wing Low Ranch, 25 miles northwest of Tucson.

190 hp torque-converter grader averages 4.73 mph on heavy ditch-cuts

The Eddie Givens Ditching Co. builds irrigation ditches for ranchers in the arable land around its headquarters at Casa Grande, Arizona. This affiliate of the Eddie Givens Construction Co. finds its investment in an Adams* POWER-*Flow** 660 grader pays off in extra work done each day . . . in faster job-completion . . . in lower costs.

Superintendent Pat Duhamell says, "This Power-Flow grader is the best blade that ever hit our company! As the need arises, we will replace our motor grader fleet with more '660's'."

After loosening dirt in place, Eddie Givens Ditching Co.'s POWER-*Flow* 660 borrows material at one side, builds 14' berm over loosened ground. With fully loaded 14' x 28" blade, grader rolls a big load at about 6 mph.

Loosens ground . . . borrows side dirt

The torque-converter-drive Adams built a 14' berm . . . foundation for a mile-long, concrete-lined feeder ditch to carry precious well water across the Wing Low Ranch, 25 miles NW of Tucson. 190 hp grader bladed through sandy loam and tough caliche subsoil . . . loosened the dirt with ditch-cuts . . . then borrowed side material and formed the berm over this loose ground.

A special ditching plow then cut out the precise ditch contour, which served as the outer form for concrete lining. During construction of the berm, water was sprinkled on the loose dirt. This aided compaction, kept ground plastic and stable for ditch-excavation, and slowed setting of concrete.

Full-throttle operation on 2700' stretch

POWER-*Flow* 660 was timed on 10 consecutive ditch-cuts. In 2nd gear-range (0.0 to 7.6 mph) grader averaged 4.73 mph per pass, from start to stop. At the end of each cut, Adams' heel-toe forward-reverse clutch made it easy to reposition, in an average 53 sec.

Operator Dick Van Weelden started each pass with a big cut, using full rpm from a dead stop. He continued with full power as he accelerated the load. At high blading speed, grader attained maximum output . . . top speed for that particular blade-load . . . fast as full engine-power could move the dirt.

Thus, POWER-*Flow* transmission actually gives you the effective work-power of an infinite number of gear ratios. Tailshaft governor maintains constant grader speed pre-selected by operator. No operator action or judgment is required. POWER-*Flow* accurately and automatically changes gear ratios in the pre-selected range, as work conditions vary . . . *automatically moves more dirt, faster!*

"Other graders just can't compare with Power-Flow 660," says Operator Van Weelden. "It has lots more power, and works faster . . . really rolls the dirt."

For your toughest grading, you'll want at least one of these profit-boosting 190 hp POWER-*Flow* 660's. Call or write for a demonstration.

*Trademark G-1523-DCJ-1

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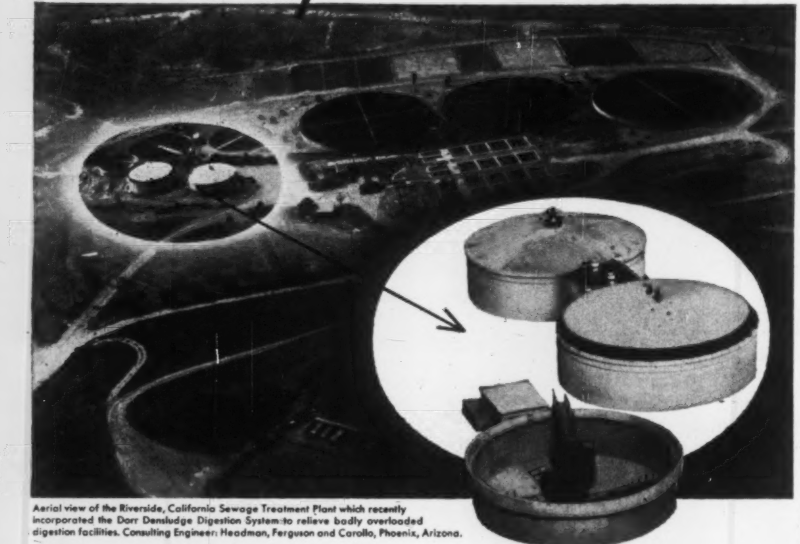

Aerial view of the Riverside, California Sewage Treatment Plant which recently incorporated the Dorr Densludge Digestion System to relieve badly overloaded digestion facilities. Consulting Engineer: Headman, Ferguson and Carollo, Phoenix, Arizona.

The Dorrco
DENSLUDGE DIGESTION SYSTEM

The new Dorrco Densludge Digestion System, already proven in full-scale treatment plants, is a new method of digesting sewage sludge that makes possible a reduction of up to 80% in digester capacity requirements compared with conventional systems. The basic operation of the Densludge Digestion System involves concentrating sludge ahead of digestion in a specially designed thickener, then digesting sludge in a Digester equipped with high-capacity draft tube mixers.

By removing the excess water in the raw sludge the Densludge Thickener reduces by one half, or more, the volume of raw sludge to the Digester. In the Digester, high capacity draft tube mixers insure full capacity utilization by maintaining homogeneous conditions throughout the tank. These reductions in sludge volume can now be directly translated into reductions in overall digester capacity requirements.

For more complete information on The Dorrco Densludge Digestion System, write for a copy of Bulletin No. 6262, Dorr-Oliver Incorporated, Barry Place, Stamford, Conn.

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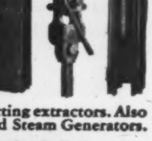

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V Mississippi and Ohio Basins

• **Upper Mississippi River**—A new $13 million lock on the Mississippi River at Keokuk, Iowa, was completed last year. It provides a lock chamber 110 ft wide by 1,200 ft long.

• **Illinois Waterway**—The $100 million deepening and widening the 16 mi **Calumet-Sag Channel**—connecting Lake Michigan with the Illinois Waterway System—is 10% finished. The channel is being widened from its 60 ft to 225 ft, and deepened to a draft depth of 9 ft. The 10 miles of channel now under contract are scheduled for completion in December 1959.

• **Lower Mississippi River**—To date, a total of $1.3 billion has been authorized for construction and maintenance on the Mississippi, of which $1 billion has been allotted to June 30, 1958. The 1,575 mi long main line levee system—the backbone of the flood control plan—is now 86% complete, while the White River backwater levee will be completed this year. The four headwater reservoirs in the **Yazoo River Basin** are complete, and the dredged channel fill for Memphis harbor is finished.

The **Old River Control** project, designed to prevent the Mississippi River from leaving its normal course and flowing down the Atchafalaya Basin, is about 20% complete. The low-sill structure, designed to pass low and normal flows of the Mississippi River into the Atchafalaya Basin, is 65% complete. The overbank structure, designed to pass flood flow from the Mississippi into the head of the Atchafalaya Basin, is about 26% complete Work on the main line levees at Old River is 7% complete, and scheduled to be finished in 1963. No work has yet been started on the navigation lock or on the closure dam across the Old River.

Other major construction in the Lower Mississippi Valley during 1957 included the $59 million project to provide by means of about 195 mi of dikes and revetment, a 9-ft channel from the mouth of the Ohio River to the mouth of the Missouri; and the $29 million **Plaquemine-Morgan City** alternate route of the Gulf Intracoastal Waterway. Construction also got underway last year on a $98 million project to provide an additional outlet from the Mississippi River at New Orleans to the Gulf of Mexico through a shorter route than the present river route and one that would not be subject to large fluctuations in river stages.

• **Ohio River Basin**—Initial construction contract was awarded last May on $167 million **Barkley Dam**, a multi-

TIPS ON LOADING

rubber-tired self-propelled scrapers

More dirt per load, more loads per hour — that's what you want. Careful planning and skillful handling of the loading part of the earthmoving cycle can increase your production, cut operating and maintenance costs, reduce job-time, and effect savings on hauling and spreading.

Plan the cycle

Even before you bid the job, plan the cycle for your dirtmoving equipment. Make it short, and with as few turns as possible. Load downhill and toward the fill wherever you can. Work a figure-8 cycle-pattern if you have a fill-cut-fill or cut-fill-cut situation. Where you have a series of short cuts and fills, plan a straight-line — cut, fill, cut, fill.

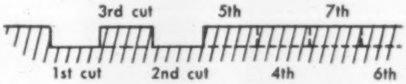
Pusher loading

With few exceptions, push-loading with a crawler or faster rubber-tired tractor is the most efficient loading method. Determine the approximate number of scrapers one pusher can handle by dividing the scraper cycle-time by the pusher cycle. For instance, a 10-minute scraper cycle divided by a 2-minute pusher cycle gives you a ratio of 5 scrapers to 1 pusher. If you have an 11-minute scraper cycle and the same 2-minute loading, it will prove more profitable to have idle pusher time than to have scrapers waiting to be loaded. Cut scraper waiting time by scheduling scrapers to enter cut at 1½ to 2-minute intervals, based on a 2-minute pusher time.

A good working target for average dirt loading is a well heaped load in 1 minute, in 100 feet of travel. An extra-long loading cycle to pack in maximum yardage of dirt is justified only if extra yardage and long haul make it pay off. Use your best tractor and most skillful operator for pusher loading. Consider teaming two scrapers equipped with push-plates, to push-load each other on smaller jobs.

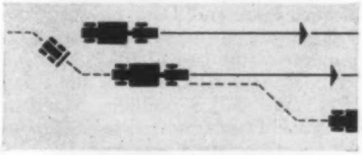
Downhill loading

To get larger loads in less time, load downhill wherever practical. This gives you 100 pounds added drawbar pull per gross ton of weight for each 5% of favorable grade. Loading toward the fill speeds up the cycle by shortening haul and eliminating turns . . . saves wear-and-tear on equipment.



Straddle loading

This short-cut leaves a ridge approximately 5′ wide between successive loads. Third pass and every other load thereafter straddles the ridge and gets load with less resistance.



Chain push-loading

In long cuts, you can save loading time by pulling empty scraper alongside unit being loaded. Pusher then need only swing-over to load the parallel scraper. In level cuts, where you can haul both ways, load alternately in both directions. Position empty scrapers for short 180° pusher-turn from loaded scraper into empty scraper's push-block.

Maintaining slope

On a side-hill cut, turn prime-mover uphill — at right-angle to cut. Then, turn prime-mover sharply to head parallel to slope. Drop the blade and start digging before the scraper has completed the turn and while it is at right-angle to slope. This cuts a low spot, levels scraper against the up-slope side, holds cut deep into the bank. Cut successive loads so as to work side hill down to grade in steps.

Loading clay or loam

Loam and most clays cut easily and load well. Very hard clays should be broken by Rooter or scarifier. Don't break material too small. Don't pack wet or sticky material too tight in bowl. Extra time loading and unloading offsets extra pay dirt and you get a lumpy spread.

Loading sand

Material that tends to run ahead of the blade and apron is best loaded by "pumping". Go into loading area fast, lower blade slowly, using momentum to fill rear of bowl. With pusher behind, "pump" bowl up-and-down so that blade goes down when scraper wheels drop into pockets from previous "pumps". To top out load, lift your blade to increase speed, then drop the bowl sharply and repeat two or three times.

Loading stone and shale

Some softer rock and shales can be loaded without preparation, but rooting usually makes the job easier and saves more than it costs. If possible, load by starting blade in dirt, then catch scraper blade under a ledge of the layered rock. Pick up loose rock or shale on level or slight upgrades to prevent material running ahead of the blade. Larger pieces of rock (and stumps) can be scooped-up by jackknifing the unit around the rock and pulling the scraper blade under it. Unloading takes a high-lift apron and cautious handling.

Loading scarified material

Begin loading toward forward end of scarified area, and finish out load against resistance of solid ground to get maximum pay load. Step back in scarified area with successive cuts.

If you want extra copies of this article, write us mentioning this publication. Please state quantity desired.

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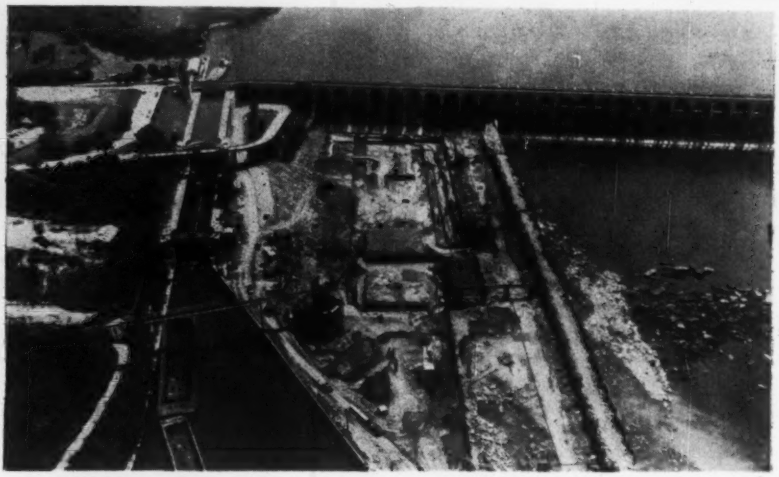


TVA'S WILSON LOCK, of 100 ft lift, is being constructed through existing Wilson Dam to left of cofferdam. Old tandem locks are at left. Navigation will not be interrupted.

purpose project on the Cumberland River mouth. The contract, which included excavation for the lock, construction of lock cofferdam and left bank earth dam, is now 50% complete. The dam will be a 130 ft high, 7,310 ft long concrete gravity and earthfill structure.

The $30.3 million **Cheatham Lock and Dam** on the Cumberland River in Tennessee, is 93% complete. **Old Hickory Lock and Dam** on the Cumberland above Nashville was 97% complete at the end of 1957.

At Markland, Ind., on the Ohio River, the $71.3 million **Markland Locks and Dam** advanced to 55% completion. **Greenup Locks and Dam** on the Ohio near Greenup, Ky., which will cost $62.2 million has hit the 95% completion mark. **New Cumberland Locks and Dam** on the Ohio, some 50 mi below Pittsburgh, is 63% complete, with total cost estimated at $43.5 million.

The Engineers also expect to award contract late in the spring of this year for initial work on **New Richmond (Ohio) Dam,** located about 32 mi above Cincinnati. Completion of Markland, New Richmond and Greenup Dams would modernize the 327 mi "Great Central Third" of the Ohio River, area of greatest traffic congestion. Modernization of **Lock and Dam 41** continued to progress during the year; project cost is $54.5 million and set for completion by June, 1962.

Other flood control projects progressed during the year. One was $33.4 million **Sutton Dam and Reservoir** on the Elk River in W. Va. Dam was 30% completed during 1957. The other, $29.4 million **Dillon Dam and Reservoir** on the Licking River in Ohio, has some preliminary work completed during the year and contract for construction of the earthfill dam will be awarded in late spring of this year.

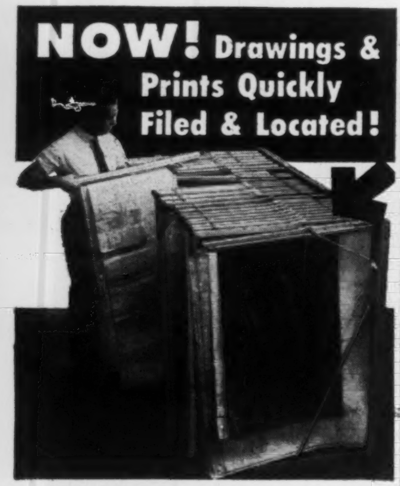
• **Tennessee Valley** – The Tennessee Valley Authority reached the halfway point on construction of $35 million Wilson Lock, whose 100 ft lift will hold the world's record for a short while before the 103 ft lock at Ice Harbor Dam is completed. The main cofferdam and lock excavation have been completed, while a contract has been let for 3.5 million cu yd of canal excavation. Concreting of the lock walls was well along at year's end.

VI Atlantic Ocean Basins

• **Great Lakes Dredging**–The Corps of Engineers' $141 million project of deepening the connecting channels of the Great Lakes is 10% finished. A total of $41 million worth of channel dredging is under way. It includes three contracts totaling $19 million for deepening the **Middle Neebish Channel** in the St. Marys River between Lakes Superior and Huron, awarded last June; and $22 million worth of contracts for deepening the **Amherstburg Channel** in the Detroit River, awarded in 1956. These contracts will be completed in 1959 and 1960, while the work on the entire project is scheduled for completion during 1964.

• **New England Flood Control**–The New England Division of the Corps of Engineers pushed forward a number of flood control projects throughout 1957.

Included in the Connecticut River Basin work: **Townshend Dam and Reservoir** is a $10.2 million project for which highway relocation work will be finished in the spring of this year. The



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Taming the Hoosic

Fast-moving tractor-on-rubber speeds widely-scattered assignments

Petricca Construction Co., Pittsfield, Mass., is working on 2 phases of the $30,000,000 Hoosic river relocation and control project. Site of this Corps of Engineers project is the river basin at North Adams, Mass.

The Hoosic drains a large part of the Berkshire Mountains in northwest Massachusetts where, in the last 30 years, flood waters have caused nearly $6,000,000 damage. Relocation of the river at some points, plus the building of new flood-control structures in the area of North Adams and Braytonville, will greatly reduce the hazard.

Travels 100 mi. in a day

On this Hoosic project, dozing, stockpiling, and push-loading assignments are scattered over a wide area. To handle these many jobs economically, Petricca's fast-moving LeTourneau-Westinghouse Tournatractor® frequently covers 100 mi. in a day of operation.

Part of the time, the "C" push-loads a 20-yd. tractor-towed scraper. Loading time averages 48 sec., in a distance of 150'. Other jobs include dozing debris, moving tree stumps, and shaping banks and slopes.

"Faster than other big tractors"

Ten years' profitable ownership of a Model C2 Tournadozer led Petricca to buy the new C Tournatractor. The older, rubber-tired "C" had demonstrated its complete mobility on job-to-job moves. This was a major factor in Owner Basilio Petricca's decision to buy a new, improved Tournatractor.

"The Tournatractor is handy," said Mr. Petricca, "well-suited for most construction work. What I like most about it is the fact it moves around so much faster than any other big tractor. If I get a rush job, I can send it from here to there on short notice. It gets the job done fast, too.

"We use our Tournatractor to doze, fine-grade, push-load scrapers, feed gravel to a crusher at our pit. We can do just about everything with it."

Less trouble . . . more profit

Before you buy your next tractor, get all the facts on mobile, rubber-tired Tournatractor. Find out why this 17 mph construction worker does a wide-range of heavy tractor work — frees you from dependence on trailers and loading crews—raises your profit margin. CT-1702-DCJ-1

A 20-yd. towed scraper is push-loaded to heaped capacity by Petricca's Tournatractor in 48 sec. This is one of many varied jobs handled by the mobile, rubber-tired machine. It often covers 100 mi. in a work day.

Operator Russ Parks likes the electric-controlled down-pressure action available on Tournatractor blade for dozing gravelly loam. Wide-base tires give tractor added traction and mobility — reduce roading shocks to machine and operator.

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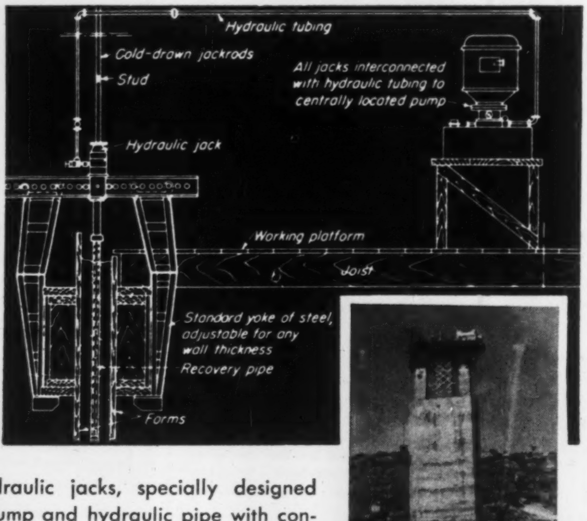
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Working platform
Joist
Standard yoke of steel, adjustable for any wall thickness
Recovery pipe
Forms

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1,700 ft long, 130 ft high earthfill dam is in final planning stage. Dam construction is scheduled for award in spring of this for $11.8 million **North Hartland Dam,** earth and rockfill structure to be 185 ft high and 1,520 ft long. The $9.7 million **North Springfield Dam and Reservoir** has Stage I dam construction nearing completion. Stage II of the 2,940 ft long, 120 ft high earthfill dam is scheduled for award this spring. Also in the Connecticut River basin is **Ball Mountain Dam and Reservoir,** a $10.9 million project now 18% complete and scheduled for completion in 1960. This earth and rockfill dam will be 985 ft long and 265 ft high.

In the Thames River Basin, **Buffumville Dam and Reservoir** is 93% complete. **Hodges Village Dam and Reservoir** had dam contract awarded early this year. Main dam of the $7.4 million **East Brimfield Dam and Reservoir** is scheduled for award this year.

Housatonic River Basin projects include: **Thomaston Dam and Reservoir,** a $17.5 million project for which railroad relocations is under way. Construction on a 2,000 ft long, 142 ft high earth and rockfill dam is scheduled for 1958.

- **Mobile River Basin**—The Corps of Engineers moderization program on the Warrior River continued with $13 million **Warrior Lock and Dam** placed in full operation in October, 1957. The $24 million **Jackson Lock and Dam** project on the Tombighee River is now in the early stages of construction.

Alabama Power Co. will begin construction on the first units of its big **Coosa** and **Warrier River** projects this year. **Lewis Smith Dam,** on a tributary of the Black Warrior, will get under way as a 160,00 kw power dam. **Weiss Dam,** at the headwaters of the Coosa River in Alabama, also is to be started as an 84,000 kw power structure.

- **Apalachicola River Basin**—Four Corps of Engineer structures are included in this basin. **Jim Woodruff Dam,** a $46 million project, began power operation in January, 1957, and was fully completed by mid-1957. **Buford Dam** on the Chattahoochee is finished at a cost of $39 million.

Fort Gaines Dam and Lock on the Chattahoochee River is nearly 10% completed with concrete being placed for the spillway. An 88 ft maximum lift lock and a 130,000 kw power plant are featured. Project cost is estimated at $86 million. The $13 million **Columbia Lock and Dam,** below Fort Gaines, is being planned for construction.

C Fullpak gets heaped loads of sand and gravel. "I have found C Tournapull Fullpaks to be ideal earthmovers," comments Superintendent Vizzare

"Terrific loaders"

help relocate highway crossing Ft. Lewis

Automobiles and trucks traveling Route 99 through Ft. Lewis, Washington, are often delayed by military cross-traffic at various points along the reservation. To speed the flow of through-traffic, the State Highway Commission is relocating 3.7 miles of highway, thereby eliminating interference by local travel of military vehicles.

Northwest Construction Company, Seattle (subcontracting all earthmoving and clearing from Woodworth Construction Company) is using a fleet of 9 LeTourneau-Westinghouse C Tournapulls with 18-yard Fullpak* scrapers and 5 older 16-yard model "C's" to move the 775,000 yards on the project. Material is mostly gravel, sand, hardpan, and a small amount of clay. About 432,000 yards of fill must be moved out of a borrow... the remainder from the right-of-way.

General Superintendent John Vineyard says, "We like the overall performance of our Fullpaks. Good loading, fine flotation — high maneuverability make this a scraper that does a very fine job for us." (Northwest recently took delivery of 6 B Tournapulls with 27-yd. Fullpak scrapers.)

Work in soft footing

Although wet weather had made some sandy gravel areas very soft, Tournapulls' big, low-pressure tires provided enough flotation and traction for Fullpaks to keep working profitably. In very slippery footing, Tournapulls' automatic power-transfer differential (channeling more power to the drive wheel on firmer ground) kept machines from cutting-in and bogging down.

"We can work our Tournapulls where other rigs would never go," says Job Superintendent Don J. Vizzare.

Finish prior road job ahead of schedule

Before coming here, the Northwest fleet helped to cut down very steep grades for a highway near Lilliwaup, Washington. Some haul cycles on the project included a very narrow turnaround that "only a C Tournapull® could have negotiated," according to General Superintendent Vineyard.

With the new C Fullpaks, this 300,000-yd. earthmoving job was finished in 5 months. This was about ⅔ the scheduled time. "Fullpaks are terrific loaders," says Job Superintendent Don Vizzare, "and they can spread material exactly where we need it. Electric controls on the Fullpak are foolproof."

Before you buy your next scraper, get complete information on the new, easy-loading C Tournapull with 18-yd. Fullpak scraper. Write for details.

*Trademark CP-1486-DC-1

On typical 5100-ft. hauls, Tournapulls traveled in 5th gear, at speeds to 28.4 mph. Pictures were taken near Ft. Lewis, Washington.

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Major Water Supply and Sanitation Projects

Projects are listed alphabetically within each regional grouping

MIDDLE WEST
MIDDLE ATLANTIC
NEW ENGLAND
SOUTH
FAR WEST
WEST OF MISSISSIPPI

New England

• **Boston** (sewerage)—Estimated construction cost has been raised from $75 million to $100 million for the Boston Metropolitan District Commission's sewerage program which is well along. The **Deer Island** treatment plant, to be the world's largest is to be started this year. The $30 million plant will be able to filter 848 mgd.

Work on a connecting link to the plant, the **Boston Main Drainage Tunnel,** an 8 mi long, 10 ft dia tunnel from South Boston to Deer Island, is expected to be completed this summer at a cost of $12 million.

• **Boston** (water)—Completion date of the **City Tunnel Extension,** a 7 mi long, 10 ft dia water tunnel has been moved from the end of last year to May of this year. Project will cost $12 million. Preliminary planning is about 90% complete on a $20 million pressure tunnel from Wachusett Reservoir in Clinton to the Marlboro Tunnel. Bids on the 9 mi long, 14 ft dia bore are expected to be advertised early this year.

• **Providence, R. I.** (sewerage)—A key project in the cleanup of Narragansett Bay pollution, the **Fields Point Sewage Treatment Plant,** is being rebuilt to increase capacity from 45 mgd to 64 mgd with a peak of 164 mgd. Started in the summer of 1956, the $3.6 million rebuilding is now 75% along and expected to be completed by June.

Middle Atlantic

• **Baltimore, Md.** (water)—Construction is scheduled to start this year on a third water source: tapping of the Susquehanna River by a 38 mi line to the Montebello Filtration Plant. Financing will be by a $45 million bond issue voted in 1955. A 49,000 ft, 96 in. pipeline from the Montebello plant to White Marsh Run will begin soon at an estimated cost of $5.5 million.

• **Harrisburg, Pa.** (sewerage)—The Harrisburg Sewerage Authority has scheduled bids and contracts during the early part of this year for an $8 million sewage treatment plant to be operation by 1960. Under a firm order from the state sanitary water board since 1950, the city will build the plant to treat sewage now being dumped into the Susquehanna River.

• **Jersey City, N. J.** (sewerage)—A $30 million sewage interceptor and treatment plant project started in 1954 was completed early this year. A primary plant in the eastern part of the city is connected to one in the western part by a twin 6 in. cast iron sludge main through which raw sludge is pumped from the eastern plant to the west plant for digestion.

• **Middlesex County, N. Y.** (sewerage)—The $30 million cleanup project of the lower end of New Jersey's Raritan River was completed at the beginning of this year. The project, which included five river crossings, features a 120 mgd pumping station, a 53 mgd chemical treatment plant, 16.3 mi of corrugated metal and concrete interceptors, and a 3.3 mi concrete and corrugated metal outfall into Raritan Bay. The use of corrugated metal pipe for sanitary sewerage and laying subaqueous corrugated metal pipe were two of the unusual features of this job.

• **Nassau County, N. Y.** (sewerage)—Disposal District No. 2's sewer program is 70% complete. Estimated costs for the 12-year program have been revised upward, to $130 million. The project includes over 1,000 mi of sewers, with interceptors and collectors for 10 collection districts. The interceptors and an $8 million, 27 mgd complete treatment plant are completed. Plans are now being prepared to enlarge the plant to 60 mgd. Started in 1949, the program is expected to be completed in 1962.

• **New York City** (sewerage)—During 1957, completion of the $41 million **Bowery Bay Project** brought to a close the first stage of New York City's $160 million pollution control program. The $260 million second stage was started in August with the letting of contract for the $10 million **Morgan Ave. Interceptor.** This is the first major contract for the **Newtown Creek** plant, to serve large areas of Brooklyn, Queens and Manhattan. In 1958, the $14 million **Kent Ave. Interceptor** will be let.

Included in the second stage are enlargement of the **Coney Island** plant from 70 to 110 mgd and of the **Rockaway Plant** from 15 to 30 mgd. Work on the Coney Island plant was started last fall, on the 90 in. dia outfall. Early in 1958, bids will be taken for the plant extension. Construction at Rockaway is expected to start this autumn. Also in 1958, major improvements will be undertaken at the following plants: Tallman's Island, 26th Ward, Owls Head and Jamaica. Under a new consent order of the Interstate Sanitation Commission, the second stage is scheduled for contract commitment by 1965.

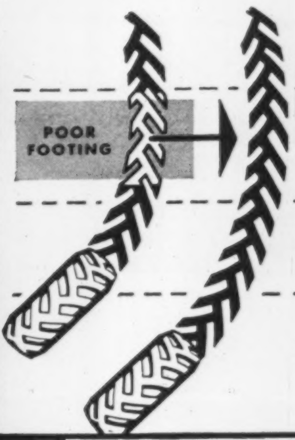
• **New York** (water)—About 15 mi of the 44 mi **West Delaware Tunnel** were driven at the end of 1957. All five contracts, aggregating $50 million, have now been awarded for this 11½ ft tunnel, as the final two were let last year. The other half of the new water supply project, **Cannonsville Dam** and reservoir, is in the preliminary stage, with access roads nearing completion. A contract for diversion of the West Delaware River is to be let this year. Completion of the project will boost the Delaware System capacity to 920 mgd and total New York City supply to 1,820 mgd.

To deliver the increased supply within the city, the Board of Water Supply, is continuing investigations for a third city tunnel to augment the two older tunnels now in use. And last year, test borings were sunk to bedrock in Upper New York Bay along a proposed tunnel line between Manhattan and Richmond boroughs.

• **Philadelphia** (sewerage)—The $3.8 million **Schuylkill West Side Intercepting System** is underway and is scheduled for completion early this year. The **Byberry Creek Intercepting System** was finished last year at a cost of $2.6 million. Contracts awarded for sewage disposal and sewers for 1957 totaled $9.5 million. This year $12.9 million is budgeted for sewerage projects.

• **Philadelphia** (water) — Contracts

How this exclusive differential works:



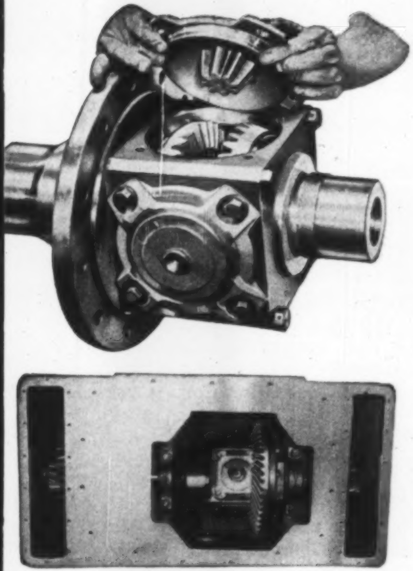
In area of overall good footing, LeTourneau-Westinghouse differential allocates power equally to both drive wheels.

When one wheel hits a soft spot and begins to slip, differential automatically transfers up to 4 times its power to wheel on firmer footing.

As slipping wheel starts to grip, power begins to equalize, until on firm ground, both drive wheels pull evenly.

On a curve, differential automatically adjusts wheel speeds for smooth, sure control. There's power on both drive wheels at all times.

More yards...longer seasons...because this unit transfers power to wheel on firmer footing



With Tournapull differential, as soon as one wheel hits a slippery spot and tends to spin, idler pinions are forced outward against friction surfaces. This automatically slows the slipping wheel, and transfers up to 4 times its tractive effort to wheel on firmer footing. Neither wheel will spin independently until the 4 to 1 ratio is exceeded.

1. Since power is transferred where it can be best used, you pull through easily where other rigs bog down . . . haul loads where many can't pull through empty.
2. Wheel "spinning" is practically eliminated . . . tires don't cut in.
3. You can work in almost any material . . . mud, loose sand, snow . . . keep rigs earning in what is normally considered shut-down weather.
4. You can extend your work season earlier in spring, later in fall.
5. You ride curves easier, safer, faster because differential equalizes tire travel, gives you better traction and better control.
6. Tire wear is reduced through elimination of slipping, spinning.
7. There is less gear shifting necessary, less loss of momentum . . . you get faster cycles.
8. Power-transfer differential works automatically at all times . . . no control action needed . . . no special maintenance is required.

Investigate this revolutionary and exclusive power-transfer differential. It is standard on all LeTourneau-Westinghouse prime-movers . . . makes a major contribution to their ability to work a longer season, cut weather delay, haul larger loads through tough going, gives a faster cycle on any kind of footing.

Ask for a demonstration to see for yourself how this power-transfer differential can make more money for you. Why not do it now?

This power-transfer differential is used on all sizes of LeTourneau-Westinghouse electric-control Tournapull-scrapers, rear-dumps, bottom dumps, flatbeds, cranes, and logging arches.

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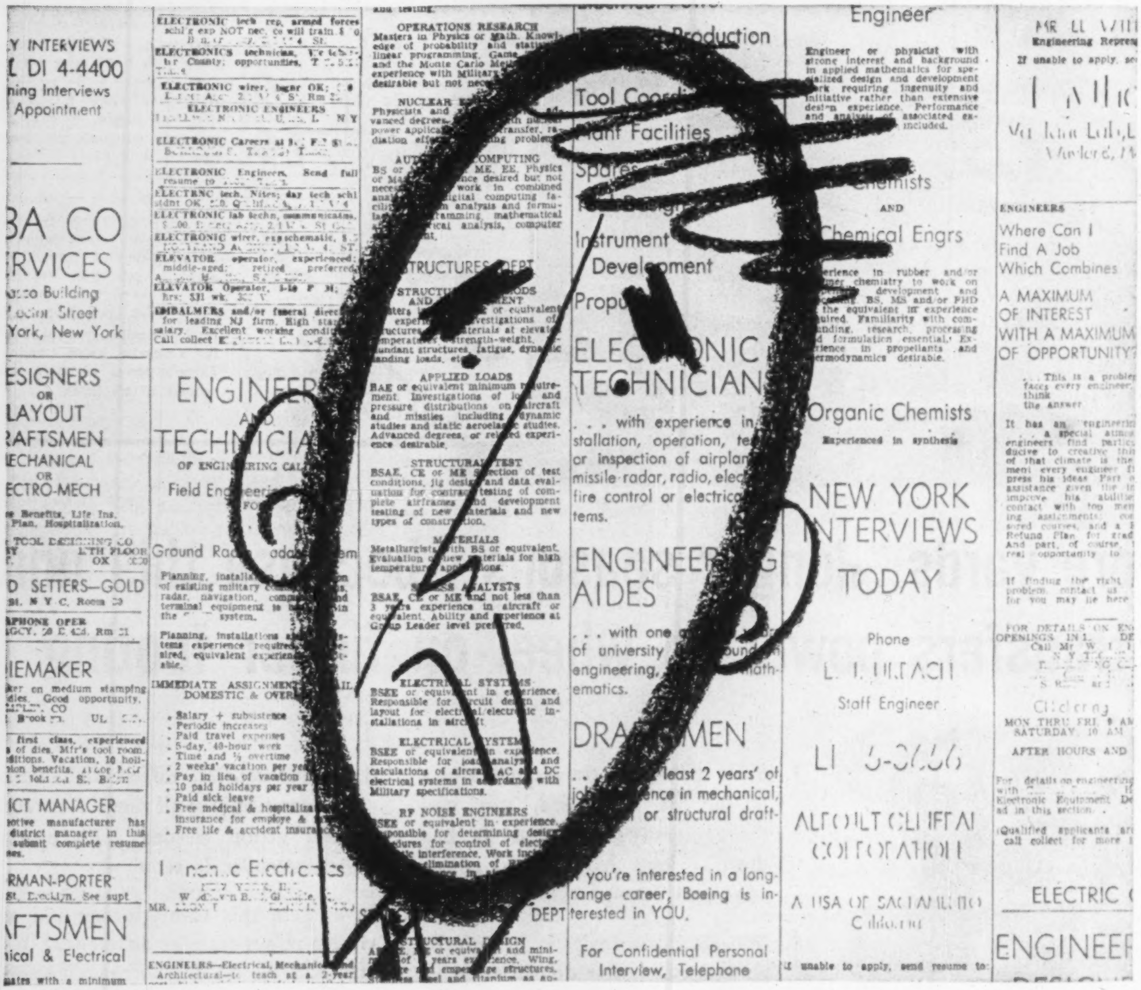
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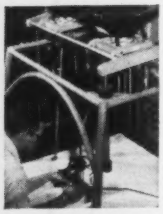

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awarded for water facilities in 1957 totaled over $9.6 million, as part of a $52 million reconstruction program at three filter plants. Construction continued at the $23 million **Torresdale** filter plant which is scheduled for completion in 1959.

Further progress was made on the extensive rehabilitation job at **Queen Lane** filter plant. Scheduled for completion in 1959, the entire job is estimated to cost $6 million. Contracts for re-building the **Belmont** filter plant, at a cost of $5.7 million, are to be let this year.

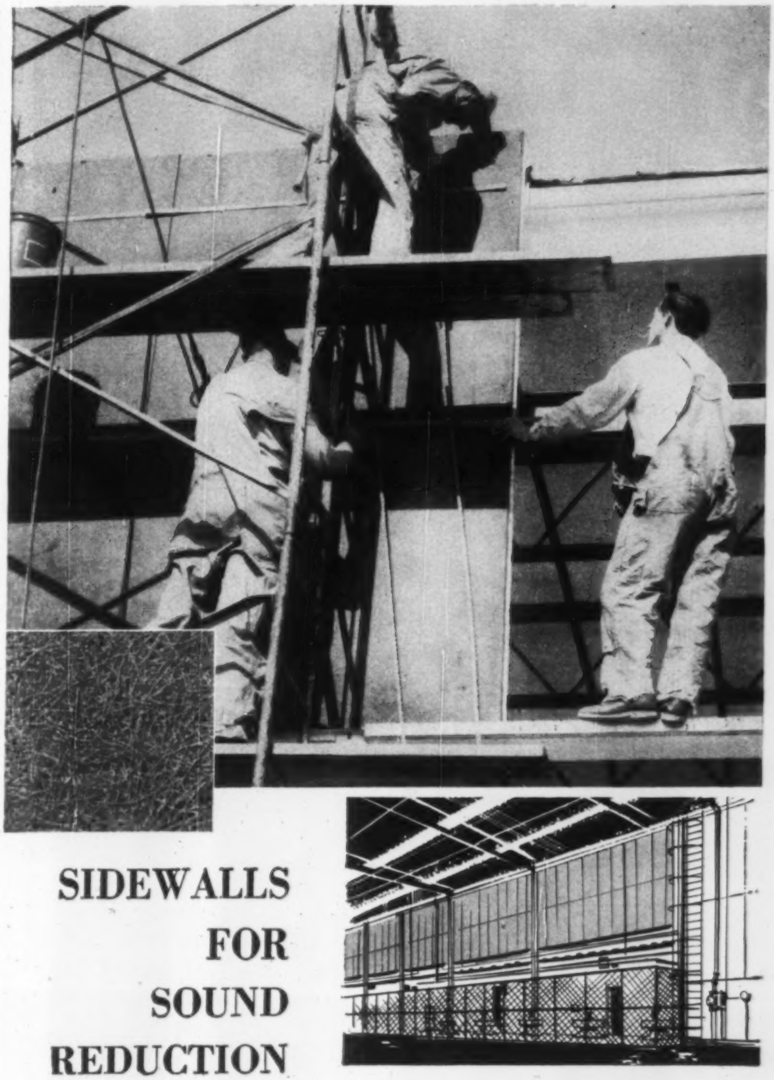
- **Pittsburgh (sewerage)**—Started in February, 1956, the $100 million interceptor and treatment plant project of the Allegheny County Sanitary Authority—to serve the City of Pittsburgh and 69 surrounding municipalities—is now over 56% complete. Full completion is expected by February, 1959. The sewer part of the project includes 30 mi of tunnel out of a total of 69 mi of interceptors. To date, 27 mi of tunnels have been excavated. The 150 mgd primary treatment plant at McKees Rocks, near Pittsburgh, is 40% completed.

- **Washington, D. C. (water)**—The $4 million, 477 mgd, 15 vertical pump **Dalecarlia Pumping Station** was nearly complete at year's end. **Little Falls Raw-Water Intake,** which includes a concrete diversion dam across the Potomac River, is 88% along in its total $4.5 million cost. **Third High Reservoir North** was put in service last year.

- **Yonkers, N. Y. (sewerage)**—Site preparation, costing $3.3 million, was completed in July for the **Westchester County Joint Treatment Plant.** Contracts totaling $6.4 million were awarded and work started in October on the treatment plant. Several contracts for approximately 8,000 ft of 54 in. reinforced concrete pressure sewer, part in rock tunnel, between the existing North Yonkers Plant—which is to become a pumping station—and the treatment plant have been awarded at a total of $1.8 million. The Joint Treatment Plant, scheduled for completion in the summer of 1959, is designed for an initial capacity of 63 mgd.

Middle West

- **Cincinnati (sewerage)**—At the end of 1957, the last major contract was awarded for the $47 million **Mill Creek Sewage Works** project. The $5 million contract involves primary settling tanks, chemical building and sludge pumping building. During the year, work proceeded on a $7 million pump house and preliminary treatment plant con-



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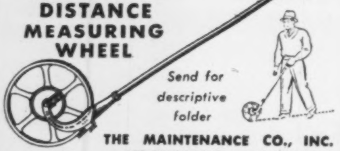

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tract which is now about 40% completed.

• **Cincinnati (water)**—Three pumping stations and an electric substation at a total cost of $1.7 million got under way during summer of 1957. Another phase in expansion of the city's waterworks, $2.6 million Chester Park central office and distribution center was started last summer.

A water pump station on the Cincinnati side of the Ohio River is planned for an early start this year. Cost is estimated at $6 million.

• **Chicago (sewerage)**—Contracts totaling $16 million for the construction of sewage treatment works and $9 million worth of sewers will be awarded this year by the Metropolitan Sanitary District of Greater Chicago.

The major portion was for seven large diameter interceptors. This year's sewer construction program includes 16 large projects.

Chicago's Department of Public Works expects to award about $13 million worth of contracts this year for the construction of 17 mi of sewers ranging in size from 2.5 ft to 21 ft. Last year contracts totaling $12 million were awarded for 13 mi of sewers.

• **Chicago (water)**—About $20.5 million worth of construction contracts will be awarded this year for Chicago's 960 mgd **Central District Filtration Plant** in Lake Michigan just north of Navy Pier. The work includes settling basins and substructure of pumping station, chemical building and administration building. The $100 million project is scheduled for completion by July, 1961.

Last year contracts were awarded for $10 million worth of filter substructures, now 50% complete, and $4 million worth of butterfly valves and filter equipment. Other major contracts include a $12.7 million system of 8 ft to 20 ft tunnels, and shafts, now 70% complete, a $4 million filtered water reservoir, virtually completed.

About $40 million worth of construction and equipment contracts remains to be awarded after this year. Chicago's $7.8 million, 25,000 ft long, 16 ft dia **79th St. Tunnel** is about 25% finished.

• **Cleveland (sewerage)** — Continuing with its capital improvement program, for which it allotted $3.5 million last year, Cleveland this year plans to spend about $8 million. Of this, $4 million will go to build a sewer and tunnel as outlet for the Kingsbury Valley drainage area, the last major link between the Kingsbury Run culvert and the Cuyahoga River. It will run about 6,000

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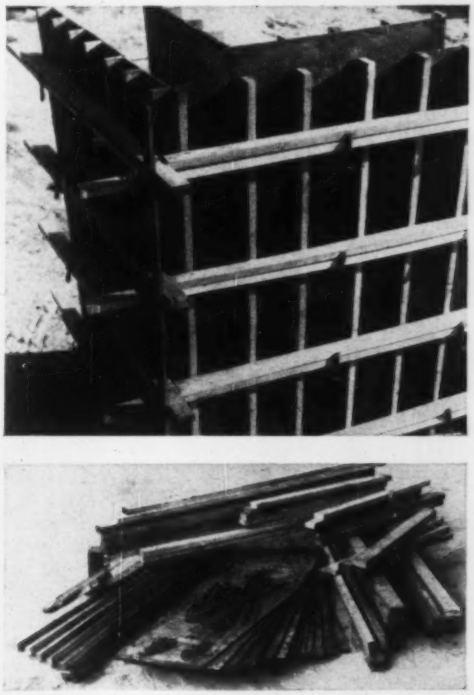

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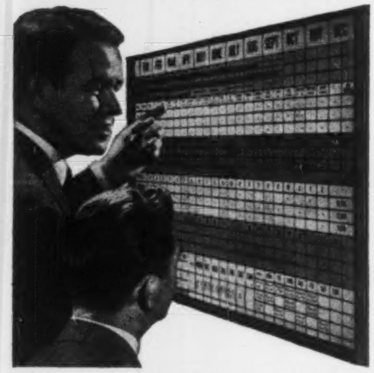

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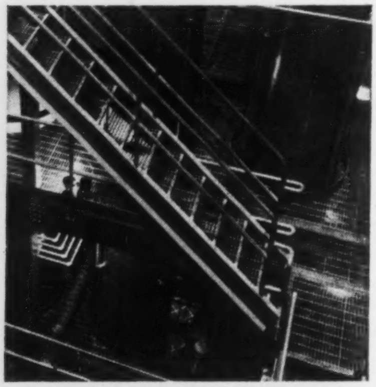

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ft long and vary in diameter from 13 to 16 ft and be an average of 60 ft below ground level.

• **Cleveland (water)**—Completion of the $22 million **Clague Water Plant,** which is 60% along, is one high-priority project for the city. Another $5 million to be allotted in 1958 is expected to bring the 50 mgd plant to completion in the summer of 1959. With an estimated $8-$10 million for water department projects in 1958, about $3 million will be spent on general rehabilitation of the Kirtland and Division pumping stations. And another $2 million will be allocated for the rehabilitation of the Baldwin and Division filtration plants.

• **Columbus, Ohio (sewerage)**—Some $7.7 million worth of improvements had been completed at the **Scioto River Sewage Disposal Plant.** A $3.2 million job, awarded last summer, to increase the plant's 50 mgd capacity to 120 mgd is 50% along and scheduled for completion this summer.

• **Detroit (water)**—Some 10 mi of 42-72 in. water mains were completed last year at a total cost of $4.7 million. A $9.8 million contract awarded last April for addition of 40 filters, settling basins and related structures to increase capacity at existing **Springwells** filter plant, was 33% completed at year's end. Increasing the pumping station's capacity by 200 mgd will run to $20 million. At 27% completion is a $2.2 million contract awarded in February 1957 for a 94 ft caisson for a raw water booster station in **Water Works Park.**

• **Detroit (sewerage)—The Conant-Mt. Elliot Relief Sewer,** started in May 1953 was completed last October. Most of its 8 mi length was built in tunnel; total cost was slightly over $14 million. The **Woodmere Pumping Station and Relief Sewer** estimated at $3.4 million, was about one-third along in 1957. The 3.9 mi **West McNichols Relief Sewer** was started in early 1957 under a $6.8 million contract scheduled for completion in November, 1958.

The above projects are integral parts of the **Master Storm Relief System** for which a complete program was prepared in 1943. To date, the program is 25% complete or under contract and about $62 million has been spent or encumbered. Present estimates are that $174 million will be required to complete the program.

• **Toledo, Ohio (sewerage)**—Last phase of the city's secondary sewage treatment plant went under contract at $4 million last year and is now 10% complete.

• **Wayne County, Mich. (water)**—Work began late last year on a $50 million water supply project in Wayne County, Mich., with the letting of $11 million worth of contracts for construction of an intake in the lower Detroit River. The project will comprise tunnels, a 150 mgd treatment plant and transmission and distribution mains in the southern part of the county.

South

• **Fairfax, Va. (sewerage)**—Fairfax County's $20 million integrated sewerage system project started in 1955 is 90% complete. The project consists of sanitary collecting sewers, trunk sewers, pumping station and three sewage treatment plants. Completion is expected in the middle of this year.

• **Fort Lauderdale, Fla. (sewerage)**—A sewer program, estimated to cost ultimately about $22 million, has been started. First phase cost is put at $6 million. A feature in sewer program will be 25 air-operated ejector stations, run from a central compressor station.

• **Louisville, Ky. (sewerage)**—The city's $5 million sewage treatment plant is scheduled to be put in operation about May 1, two years after it was started. By that time, enough of the city's $10.3 million interceptor system now under construction will be completed to permit the plan to operate at 30% of capacity. Plant is designed for maximum of 300 mgd.

• **Melbourne, Fla. (water)**—A $6.7 million project to bring water from Lake Washington, a part of the St. Johns River, is under way. Transmission lines to serve the beach area are now being laid, and a filtration plant will be built on the shore of the lake.

• **St. Petersburg, Fla. (sewerage)**—Started in 1955, a $30 million project to sewer unsewered portions of the city is about 60% complete.

• **Tampa, Fla. (sewerage)**—A $10 million project to sewer newly annexed areas of Tampa, started in 1955, is 98% complete. Some 200 mi of sanitary and 25 mi of trunk lines are involved.

West of Mississippi

• **Denver, Colo. (water)**—Contract construction work began during 1957 on four major units of Denver Water Board's $101 million expansion program. Largest is 23 mi **Roberts Tunnel** which will bring west slope water beneath the Continental Divide to the city. It will be a 10 ft dia concrete

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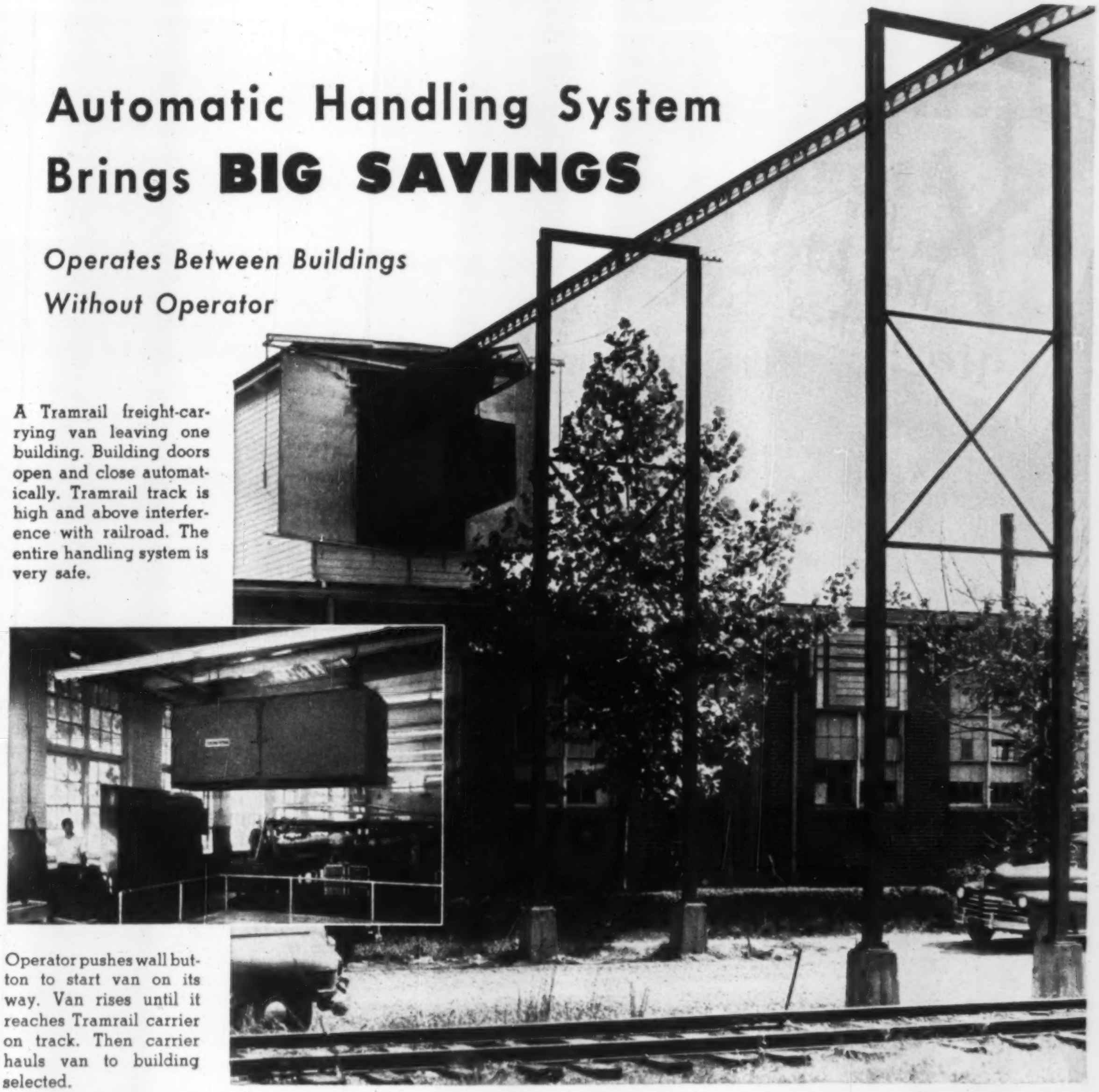

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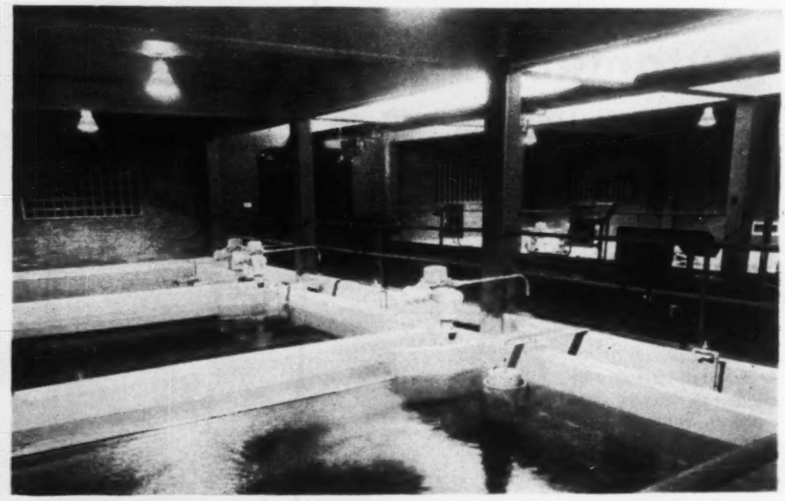

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lined tunnel built under a $38.9 million contract. Second job is a $6.5 million arch dam to form **William Fork Reservoir,** due for completion at the end of this year. A $4.6 million contract to line the east half of **Moffat Tunnel** (12,400 ft, 10½ ft finished diameter) is to be completed in April. Lastly, a $6.3 million contract to line 1.5 mi of **Jones Pass Tunnel** and drive 7 ft, 3.4 mi **Vasquez Tunnel** is to be finished this year.

• **Fort Worth, Tex. (water)**—Major work on water facilities included work on the $4 million **South Holly Treatment Plant** to be completed May 1958.

• **Kansas City, Mo. (water)**—Kansas City is planning to expand pumping and distributing facilities in 1958 at cost of about $6 million.

Nearly complete is a $16 million enlargement of the main treatment plant; the last part, a chemical house, is to be in use this summer. The new **Turkey Creek Pumping Station,** costing $6 million, went into operation last May. The city has now spent $25 million of a $52 million bond issue passed in four parcels from 1951 to 1956.

Far West

• **Colorado River Aqueduct**—One of the largest pipe fabrication and installation jobs ever attempted in Southern California was in progress during 1957. Under two separate contracts awarded by the Metropolitan Water District of Southern California, 47 inverted siphons totaling 12 mi in length are being placed along a 183 mi segment of the Colorado River Aqueduct. Total cost of the project is $16 million. Inside diameters of the siphons are 13 and 13½ ft. Work on the first contract was 30% complete by year's end, and a start was made on the second.

Six contracts, amounting to about $19 million for expansion of three feeders of the MWD distribution system reached virtual completion in 1957. A $12 million contract was awarded late in the year for the final 14.2 mi of what is called the **Lower Feeder.** This extent of welded steel pipe will run from Santa Ana Canyon to the east boundary of Los Angeles County. Construction also began on 11.6 mi of the **Culver City Lateral** at a cost of about $5 million.

• **East Bay Municipal Utility District (water)**—A new 13,500 hp pumping plant at Walnut Creek, Calif. to boost daily flow through the **Mokelumne Aqueduct** to the East Bay Municipal Utility District is more than 52% completed. This year a start is expected on the third barrel of the aqueduct, a $65.5 million job.

• **Los Angeles (sewerage)**—By year's end, some $45 million worth of construction was either completed or under way in Los Angeles' **Hyperion** sewerage project, being financed by a $60 million bond issue. A $4 million enlargement of the existing treatment plant was 22% complete. Plant modifications will change Hyperion from a 245 mgd high rate activated sludge treatment to a combination of primary and conventional activated sludge treatment with an average capacity of 420 mgd and a peak of 720 mgd. The work includes new primary settling tanks and a new headworks building.

(Continued on page 247)

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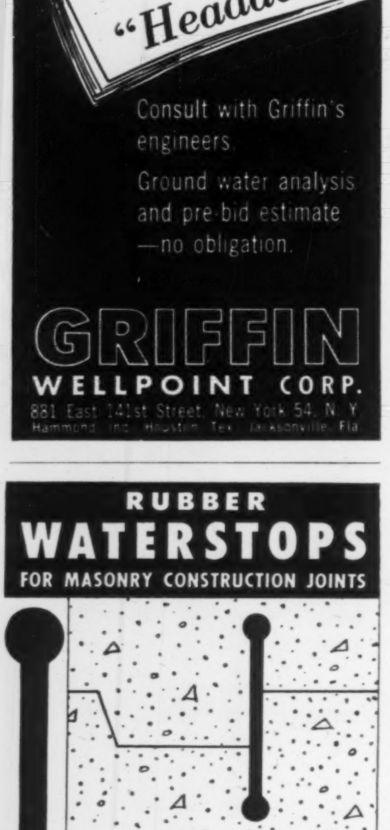

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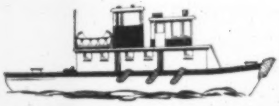

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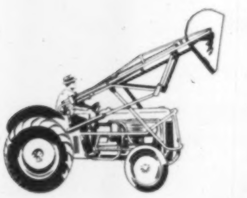

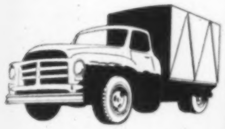

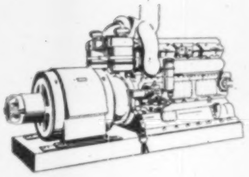

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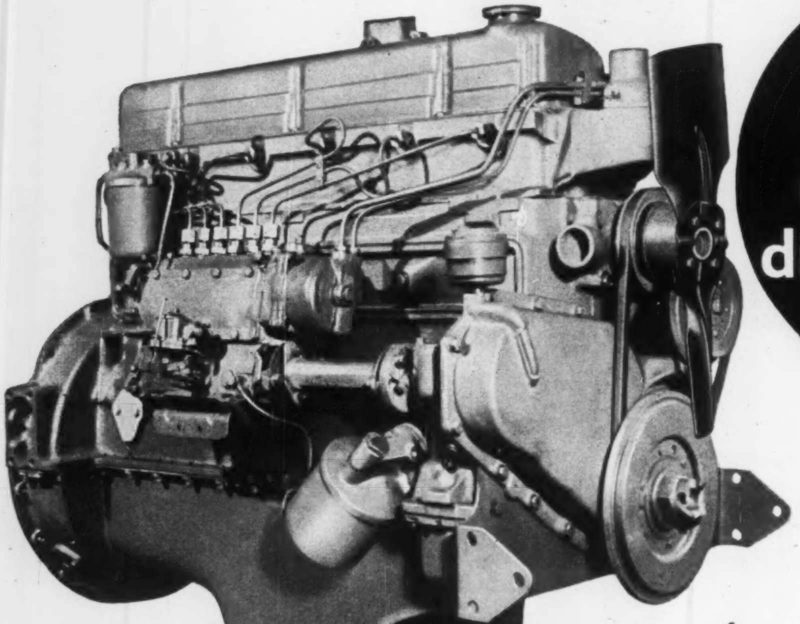

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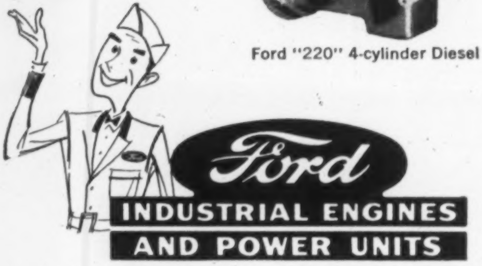

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Brake Horsepower	Dynamometer	61 @ 2250	96 @ 2250
	Continuous	49 @ 2250	77 @ 2250
Torque	Dynamometer	152#' @ 1600	236#' @ 1500
	Continuous	131#' @ 1600	189#' @ 1500
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Reported well advanced during 1957 was the $11 million main trunk sewer, called the **North Central Outfall Sewer.** This 9½ ft dia trunk is 8 mi long and will be completed by June 1958.

- **San Diego Aqueduct**—A $5.3 million contract award late in 1957 marked construction start of a second aqueduct connecting the Colorado River Aqueduct and San Diego. The 12 mi section north of the San Diego County line is the first of a 40 mi stretch to be started by the Metropolitan Water District of Southern California. Meanwhile, the San Diego County Water Authority is preparing to start on 64 mi of aqueduct and connecting lines in that county under a $35 million bond issue. Capacity of the system to be completed in 1959 is 250 cfs.

- **San Diego, Calif.** (sewerage)—Design of the proposed $25 million sewerage system for San Diego is just getting under way. Studies on the effect sewage discharges would have on offshore waters are nearly completed.

- **San Francisco (water)**—Excavation was started late in the year on a $50 million addition to San Francisco's Hetch Hetchy water and power development in the high Sierras. The $8.1 million part under way includes a 29,200 ft long, 12 ft dia tunnel connecting Cherry Dam with penstocks leading to Cherry powerhouse, and a diversion tunnel from Lake Eleanor watershed into Cherry Reservoir. This July, bids are to be called on the $6 million, 135,000 kw Cherry powerhouse.

- **Seattle** (sewerage)—The Lake City Sewer District, north of Seattle, awarded contracts during the year for construction of 3.6 mi of 8-36 in. sewers costing $3.2 million and will award contracts this year for about the same amount.

Within Seattle, the city awarded contracts for about half the work in a $4.5 million West Seattle sewage program, including a new treatment plant, and expects work to be completed by the end of 1958.

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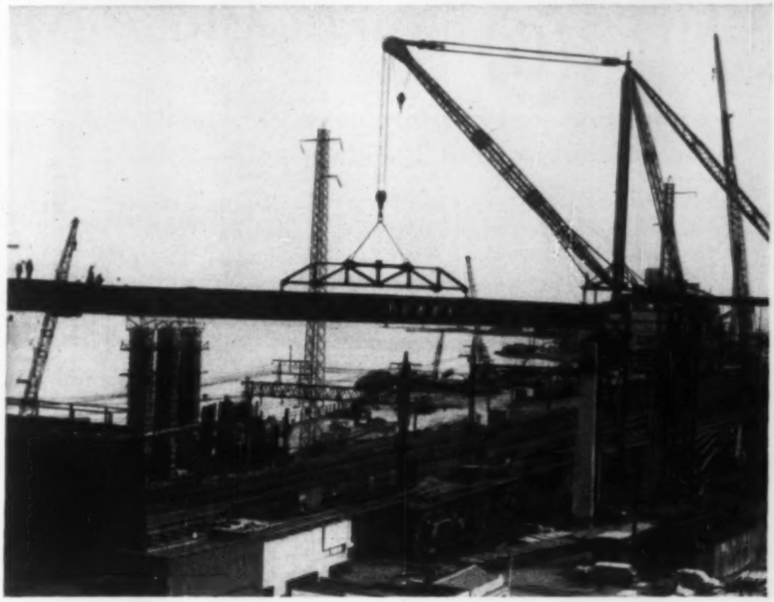

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GREENHEART (Demerara) Inc.
52 Vanderbilt Av., New York 17, N.Y.
Telephone: Murray Hill 6-0410

Prices Seesaw in Close Niagara Bidding

Excavation and reinforcing steel prices account for the low bid on $98.3 million power plant project

Merritt-Chapman & Scott Corp.'s $98,288,498 low bid for the Lewiston powerhouse of the Niagara Power Project, hinged on three big items: unclassified excavation at $2.65 per cu yd for 6.7 million yards at the power plant was $2,345,000 under the second bid; 2.36 million cu yd at $2.50 for the forebay canal was $708,000 under; and reinforcing bars, 60 million lb at 15¢, was $540,000 low.

Work covers construction of the main power plant of the $600 million Niagara Power Project for the Power Authority of the State of New York. Included are the forebay, penstocks, cofferdams, access tunnels, shafts and roads, wood pole structures, insulators, conduits, installing turbines, conductors and ground system.

The low bid is 3.4% below the second and 16% below the high of four bids.

Located on the U. S. side of the Niagara River, about four miles from the City of Niagara Falls, Lewiston powerhouse is 1,100 ft long and will cut 300 ft into the 45 deg, 310-ft-high cliff overlooking the river. It will be an outdoor type plant with exposed gantry cranes operating over the generator equipment and the draft tube gates (ENR Aug. 22, 1957, p. 27).

Water will feed through 25 ft dia steel lined concrete encased penstocks, which will lie on the cliffside.

Over 9.6 million cu yd of excavation will be required, at a cost of $26.5 millions, or 27% of the total. Approximately $38.5 million, or 39% of the total, will go into concrete for structures, paving and other items, plus $6.72 million, or 6.8%, for 1.21 million lb of cement.

The contractor is moving equipment and personnel to the site since temporary financing has been arranged (a $100 million bank loan) and the Federal Power Commission license terms have been accepted by the authority.

Wage rates on this job include: Carpenters, $3.425; ironworkers, $3.60; electricians, $3.64; tractor operators, $3.575; truck drivers, $2.90; cement machine operators, $3.55; common labor, $2.80.

The bidding included:

1C	Merritt-Chapman & Scott Corp., NYC	$98,288,498
2	Perini Corp., Walsh Const. Co. and C. J. Langenfelder & Sons Inc	101,778,312
4	Peter Kiewit Sons' Co., Morrison Knudsen Co., Inc., Henry J. Kaiser Co., S. J. Groves & Sons Co., Cunningham-Kiewit Co	117,215,818

Bids: 1-9-58 Item	Unit	Quan-tity	Unit Prices 1C	2
Care of water	ls	job	$2,000,000	$1,012,500
Exc, uncl, acc road	cy	205,000	2.75	4.30
Forebay Canal	cy	2,360,000	2.50	2.80
power plant	cy	6,700,000	2.65	3.00
cofferdam	cy	325,000	5.00	4.42
Final fndn cleanup	sy	115,000	5.00	6.70
Drill line holes	lf	366,000	0.75	1.20
and broach	sf	30,000	2.50	6.45
Scale rock faces	cy	30,000	4.00	6.70
Exc, uncl, misc struct	cy	47,000	4.00	3.65
Fndn protect, 1"	sf	820,000	0.50	0.37
4"	sf	55,000	1.25	1.55
Exc, uncl, acc tunnels & shafts	cy	5,100	100.00	48.00
Grt holes in conc	lf	600	5.00	7.88
Drill & grt holes in overburden	lf	30,000	6.00	3.50
core, NX holes in stage bet depth 0'–50'	lf	4,000	7.00	8.93
50'–150'	lf	2,700	8.00	6.30
150'–300'	lf	2,200	8.50	6.30
grt holes, 0'–50'	lf	70,000	4.25	3.30
50'–150'	lf	121,500	4.75	1.89
150'–300'	lf	50,300	5.25	1.89
MP & ftgs for grtg & drain f&p	lf	400,000	0.70	0.65
Drill drain holes in stages bet depth 0'–40'	lf	31,100	7.00	4.20
40'–300'	lf	11,000	8.00	5.25
Drains, split SP	lf	1,000	12.00	5.92
Pr. grtg fndn, guar amt	cf	50,000	4.00	6.00
non-guar amt 50,000–150,000 cf	cf	100,000	2.50	1.10
over 150,000 cf	cf	100,000	2.00	0.84
Conn to grt holes	ea	1,200	12.00	26.25
Sand for cmt grt mix	cf	10,000	0.75	0.49
Drill drain holes for drain tunnel	lf	24,000	12.00	4.46
Embankmt, acc roads	cy	135,000	1.50	3.52
Base crse, filled stone	cy	3,200	10.00	10.22
Bit mat, penet meth	gal	57,000	1.00	0.28
Asph conc plantmix	t	6,600	15.00	14.61
Hwy gd rail f&e	lf	2,400	4.50	4.14
Backfill	cy	135,000	1.50	2.27
Screened gravel	cy	7,500	8.00	9.11
Stab shoulders	cy	1,000	20.00	9.42
Temp reloc Lewiston Rd & exist facil at pwr plt	ls	job	500,000	588,556
acc rd to reserv	ls	job	100,000	150,473
Seal coat	sy	12,000	1.50	0.31
CMCP, 18"φ f&i	lf	1,050	20.00	6.80
24"φ f&i	lf	600	20.00	9.50
Fndn crse stone	cy	19,000	10.00	5.68
Conc median strip	lf	4,000	15.00	6.49
Granite curbs	lf	7,500	6.00	10.07
Reloc Lewiston Rd, Devils Hole to pwr plt	ls	job	60,000	167,331
VCP, perf drain 4φ f&i	lf	7,500	4.00	1.62
CMCP, 12"φ f&i	lf	4,500	7.00	7.46
Cement, Portland	bbl	1,058,000	5.50	4.62
Natural	bbl	150,500	6.00	5.70
Reinforcement bars	lb	60,000,000	0.15	0.159
Conc, intake struct	cy	425,000	20.00	19.68
hwy struct at intake	cy	15,000	100.00	158.10
generator struct first stage	cy	136,000	40.00	29.96
second stage	cy	23,000	26.00	31.36
third stage	cy	45,000	40.00	36.10
transformer struct base mat	cy	106,000	20.00	18.55
upper part	cy	27,000	100.00	124.25
in office & erect bay substruct	cy	21,500	40.00	45.46
superstruct	cy	1,100	200.00	233.63
control & pwr tunnels	cy	6,000	100.00	136.26
penstock area paving	cy	10,500	35.00	42.61
encasement	cy	95,000	20.00	23.55
abutments & buttresses	cy	104,000	65.00	42.91
forebay & tailrace aprons	cy	7,600	20.00	10.53
retaining & facing walls	cy	8,300	22.00	26.62
misc structs	cy	3,000	80.00	192.97
blockouts	cy	1,000	40.00	150.14
cover slabs over memb waterprfg	cy	2,000	75.00	80.64
equip fndn pads	cy	1,000	50.00	221.13
bonded conc floor finish	sf	116,000	0.75	1.37
wall base	lf	6,000	2.00	6.50
Flat paint at contraction jts	sf	77,000	0.07	0.29
Asph in seal wells	cf	150	100.00	15.78
Rubber water stops, dumbbell type, 9"	lf	21,500	6.00	4.32
Steel water stops	lf	6,000	5.00	2.25
corrosion resist	lf	1,200	4.00	5.41
Premoulded jt filler	sf	37,500	1.00	0.71
Conc jt sealer	lb	10,000	0.60	0.82
Cork tar mastic	sf	50,000	1.25	1.94
Membrane waterprfg	sf	351,000	0.50	0.63
Dampproofing	sf	30,000	0.25	0.20
Conc, ready mixed	cy	2,300	100.00	86.91
Conc, So abutment #1	cy	30,000	35.00	42.57
roadway slabs	cy	11,200	50.00	65.64
yard paving	cy	4,000	30.00	79.37
erection bay architectural wall	cy	2,200	120.00	286.68
prestressed beams	ls	job	1,500,000	1,884,667
Drill & grt anchor rods	lf	20,000	5.50	10.51
Rubber water stops hollow center bulb, dumbbell type, 9"	lf	5,500	5.00	4.81
Conc for drain tunnels & acc shafts	cy	2,800	100.00	104.59
Struct stl in office, contr & erection bay	allow		850,000	850,000
Draft tube pier noses i	lb	320,000	0.30	0.07
Rails & access i	lb	400,000	0.25	0.24
Galv struct stl transmission towers i	lb	400,000	0.15	0.33
5 usbl	lb	250,000	0.03	0.14
Superstruct stl, Lewiston Rd bri i	lb	220,000	0.10	.067
Intake hoist hatch covers i	lb	214,000	0.30	.087
Stl & iron, misc f&i	lb	150,000	0.70	1.16
galv, misc f&i	lb	310,000	0.75	1.12
Aluminum, misc f&i	lb	30,000	4.00	2.47
Stainless stl, misc f&i	lb	7,500	2.00	3.19
Galv grate, 3" & over f&i	lb	140,000	0.60	0.98
Safety treads f&i	lb	50,000	0.75	1.14
Anchor mater for elec equip i	lb	10,000	1.50	2.28
Conc block, 8" f&i	sf	4,000	1.30	1.89
lt wgt f&i	sf	23,000	1.40	1.89
Struct clay tile, 2" f&i	sf	2,000	1.10	1.58
4" f&i	sf	14,300	1.10	1.79
6" f&i	sf	16,000	1.40	2.10
8" f&i	sf	48,000	2.00	2.31
facing stack bond, 6T series, 2" i	sf	3,000	2.20	2.95
8W 4" i	sf	14,000	1.65	2.10
6T 6" i	sf	3,200	2.70	3.15
8" i	sf	45,000	3.00	3.47
running bond 6T series, 4" i	sf	900	2.30	3.05
Wall tile ceramic, glazed, 4"x4" f&i	sf	5,000	2.75	2.63
6"x9" f&i	sf	12,500	3.00	2.63
Quarry tile, 6"x6" f&i	sf	500	2.00	2.10
9"x9" f&i	sf	56,000	2.10	1.89
base, 6" f&i	lf	5,000	1.90	2.36
Floor tile, ceramic mosaic f&i	sf	4,000	2.20	2.10
rubber, 9"x9" f&i	sf	8,300	0.75	1.58
12"x12" f&i	sf	6,000	0.75	1.58
Rubber tile base f&i	sf	500	0.55	0.84
Floor tile, vinyl asb, 9"x9" f&i	sf	900	0.50	1.05
Marble work f&i	allow	job	40,000	40,000
Terrazzo f&i	allow	job	19,000	19,000
Furring & lathing f&i	sy	5,000	5.25	6.83
Plaster, gypsum 2-ct f&i	sy	5,000	4.10	4.73
3-ct f&i	sy	1,400	3.90	5.78
acoustical f&i	sy	800	2.20	6.30
cement f&i	sy	7,500	5.10	5.78
Keene's cement f&i	sy	600	4.50	6.30
Acoustical tile work f&i	allow	job	7,000	7,000
Granite work f&i	allow	job	1,000	1,000
Wall panels, cast stone	sf	24,000	3.30	2.63
Built up roofing f&i	sf	39,000	1.00	1.05

ONE OF A SERIES of advertisements to help the construction industry get better service from wire rope.

SHOVEL Chain, Electric, or Steam Crowd
1, 2, 3, Part or Twin Main Hoist Line

DIPPER LATCH LINE

6 x 36G	PREformed Regular Lay Whyte Strand Fiber Core
8 x 19E	PREformed Regular Lay Whyte Strand Fiber Core
7 x 19	PREformed Aircraft Cord sizes under ¼"

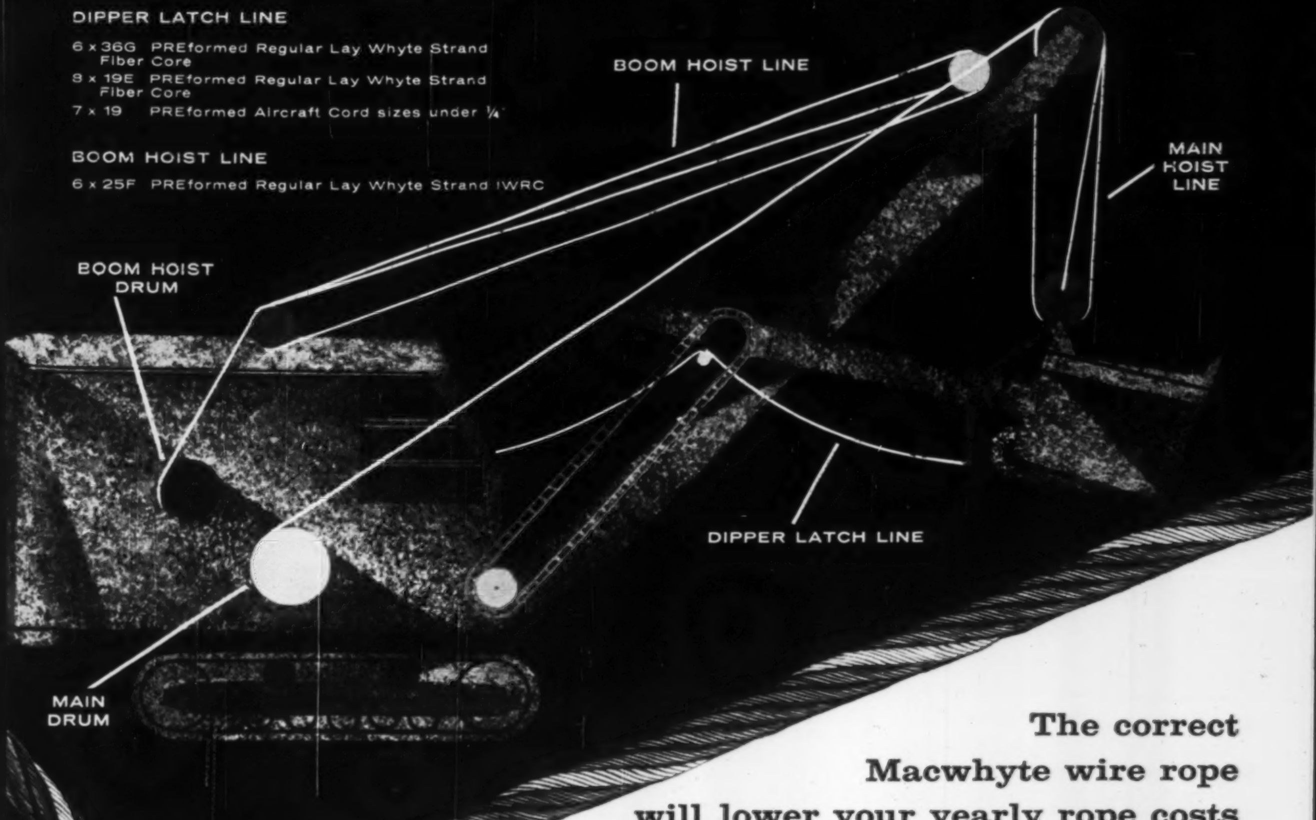
BOOM HOIST LINE

6 x 25F	PREformed Regular Lay Whyte Strand IWRC

MAIN HOIST LINE

⅝" and ¾"	6 x 25F	PREformed Lang Lay Whyte Strand IWRC
	6 x 25F	PREformed Regular Lay Whyte Strand IWRC
⅞" and Larger	6 x 25F	PREformed Lang Lay Whyte Strand IWRC
*1" and Larger	6 x 41 F	PREformed Lang Lay Whyte Strand IWRC

*Where sheaves or drum diameters are less than 22 times rope diameter.



The correct Macwhyte wire rope will lower your yearly rope costs

You will make substantial savings in the amount of money you spend every year on wire rope for shovels — or any other equipment — if you use the right *type* of rope designed for your job.

Shown above are correct recommended wire ropes for use as main hoist line, dipper latch line, and boom hoist line on power-shovels. Each of the Macwhyte wire ropes listed is designed to shrug off the normal abuse, strain, and abrasion encountered in shovel service, and to offer exceptional service life.

Whyte Strand wire ropes are PREformed to eliminate any internal stresses in manufacture. This is particularly important in shovel service, where rough use and reverse bends subject *any* wire rope to severe flexing and bending strains as it curves around sheaves and drums.

In addition, every inch of Whyte Strand wire rope is internally lubricated. As the rope flexes, this enables adjoining wires to move by each other without wear, and extends the life of the rope. The tenacious lubricant also protects the exterior strands against moisture and corrosion.

Reeve up your shovels with Whyte Strand wire rope and watch rope costs drop!

103

MACWHYTE Wire Rope COMPANY

MACWHYTE WIRE ROPE COMPANY
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Bids; 1-9-58		Quan-	Unit Prices	
Items	Unit	tity	1C	2
Sht met flashing f&i	sf	9,500	2.00	3.15
Hollow met doors & frames i	sf	3,850	5.50	3.14
tin clad fire doors i	sf	1,060	5.50	5.25
Aluminum & stainless stl entr & doors f&i	allow	job	12,000	12,000
Furnish finish hwre	allow	job	21,000	21,000
Met toilet & shwr rm partitions & enclosures	allow	job	5,500	5,500
Toilet room accessories				
soap dispensers i	ea	23	11.00	2.00
mirrors i	ea	15	11.00	10.40
paper towel dispens. i	ea	10	11.00	5.30
waste paper recept i	ea	10	6.00	2.10
plate glass shelves i	ea	23	11.00	6.00
Plumbing fixtures				
water closets, seat & flush valve i	assem	21	55.00	53.00
lavatories, valves & chrome fittings i	assem	23	55.00	53.00
urinols & valves i	assem	9	55.00	53.00
shower heads & mixing valves i	assem	4	55.00	52.50
utility sink & ftgs i	assem	3	55.00	53.00
drinking fount & ftgs i	assem	4	55.00	31.50
Cellular glass block insulation, 1½" f&i	sf	24,000	1.25	0.63
Metal lockers i	unit	150	16.50	10.50
shelving i	unit	12	55.00	52.50
Glass & glazing f&i	allow	job	27,000	27,000
Alum fixed & pivoted windows & mullions f&i	allow	job	81,000	81,000
window wall f&i	allow	job	55,000	55,000
Ornamental				
stl work i	lb	195,000	0.22	0.21
alum work i	lb	10,000	0.88	0.27
stainl stl wk i	lb	2,000	1.10	0.32
Gate guide towers for				
intake gates i	lb	1,900,000	0.07	0.165
draft tube gates i	lb	925,000	0.09	0.20
intake stop logs i	lb	1,350,000	0.08	0.17
Guides for trashrks i	lb	540,000	0.11	0.215
Intake gates i	lb	3,850,000	.055	0.04
Draft tube gates i	lb	118,000	0.08	0.06
Trashracks i	lb	1,020,000	0.06	0.08
Stop logs i	lb	268,000	0.05	0.05
Generat hatch covers i	lb	852,000	0.11	0.09
Gantry crane, 630 t i	lb	1,500,000	0.10	0.11
90 t i	lb	180,000	0.14	0.275
30 t i	lb	60,000	0.13	0.45
Trav cranes, 2-7½ t & 1-150 t i	lb	250,000	0.08	0.29
Intake gate hoists i	lb	785,000	0.08	0.09
Motor driven air compressors i	lb	55,000	0.08	0.31
After coolers i	lb	3,500	0.15	0.80
Air receivers i	lb	35,000	0.07	0.20
Oil pumps i	lb	5,500	0.23	0.60
Water pumps i	lb	1,500	0.43	1.20
Sump pumps & water level controllers i	lb	39,000	0.19	0.24
Sewage pumps i	lb	1,600	0.30	1.27
Portable oil purifier & filter paper drying oven & 2 centrifuges	lb	5,100	0.25	0.66
Machine tools i	lb	26,000	0.30	0.44
Water level transmitters & recorders	assem	2	110.00	730.00
Sht met ductwork f&i	sf	132,000	1.10	2.49
Duct insul, tp A f&a	sf	33,000	1.60	2.20
B f&a	sf	25,000	1.60	2.20
C f&a	sf	14,000	1.10	1.62
D f&a	sf	10,000	1.10	1.62
E f&a	sf	1,000	2.50	3.66
Cooling coils i	lb	12,000	0.40	0.59
Centrifugal fans i	lb	65,000	0.45	0.82
Propeller type fans i	lb	5,500	0.58	1.60
Grilles, registers & diffusers i	lb	20,000	0.55	1.25
Louvers & dampers i	sf	4,000	0.94	2.76
Filters i	lb	4,000	0.25	0.63
Electric heaters i	lb	22,000	0.42	0.75
Air condition &/or ventilat cabinets i	lb	39,000	0.17	0.47
Electronic precipat i	lb	15,000	0.16	0.23
Refrig compressors i	lb	32,000	0.08	0.21
Controls i	lb	130	10.20	47.50
Fire hose cabinets, compl with equip i	ea	23	60.00	135.00
Hose racks i	ea	12	36.25	55.50
Portable fire extinguishers i	ea	100	17.60	13.30
4-75 lb cart mounted CO_2 cylinders & 2 hose reel carts pl	lb	2,000	0.14	0.24
Transformer transfer cars assem	lb	40,000	0.09	0.09
Oil storage tanks i	lb	38,000	0.07	0.08
Chilled water unit i	lb	1,000	0.22	0.69
Flow water & level meters & recorders	assem	13	60.00	325.00
Instal & test 13 hydraulic turbines	ls	job	657,000	763,500
Governors for hydraulic turbines, 13 i	ls	job	39,000	78,600
Spiral case sects uhs	t	2,600	40.00	9.12
Stl & gen wrought iron pipe, ftgs & vlves, 2"φ & under i	lb	134,000	1.44	0.74
2½" to & incl 6"φ i	lb	162,000	1.04	0.55
8" & over i	lb	380,000	0.75	0.44
CIP ftgs i	lb	372,000	0.18	0.35
CI soil pipe & ftgs, embedded, for roof, deck, floor & plumb system i	lb	520,000	0.20	0.29
Copper pipe &/or tubing & ftgs, 3" & under i	lb	24,000	2.68	3.16
Pipe hangers & supp i	lb	15,000	1.89	1.61
Sp vlves & strainers i	lb	122,000	0.33	1.00
Elec dr water coolers i	ea	3	135.00	140.00
Storage water hters i	ea	5	270.00	130.00
Name plates i	ea	2,000	3.25	4.50
Pipe markers app	ea	8,000	0.33	0.12
Insul, fibrocel VB app	sf	6,000	0.77	1.30
hair felt blanket app	sf	2,000	0.33	0.90
Asb pipe cement i	lb	70,000	0.33	0.85
Mater for elec contractor uhsm	t	22,000	28.82	19.50
Grdg sys, Size A f&i	lb	10,000	5.50	6.30
B f&i	lb	475,000	1.65	2.90
Met conduit, incl box & ftgs, Size A f&i	lb	250,000	1.32	2.31
B f&i	lb	250,000	1.65	1.60
C f&i	lb	78,000	1.54	1.50
Non-met conduit, incl ftgs, all sizes f&i	lf	5,000	2.20	2.10
Wood pole struct				
230 kv, tp A fa&e	assem	8	1,870	1,785
B fa&e	assem	1	2,310	2,200
C fa&e	assem	1	2,640	2,500
69 kv A fa&e	assem	36	880.00	840.00
B fa&e	assem	6	1,210	1,155
C fa&e	assem	16	1,760	1,680
Insulator units, sing susp string				
7-15,000 lb a&i	str	162	33.00	32.00
16-15,000 lb a&i	str	30	33.00	32.00
18-25,000 lb a&i	str	9	33.00	32.00
sing strain string				
9-15,000 lb a&i	str	96	33.00	32.00
18-15,000 lb a&i	str	12	165.00	160.00
20-15 000 lb a&i	str	6	165.00	160.00
20-15,000 lb a&i	str	3	165.00	160.00
dble susp string with upper yoke only				
7-15,000 lb. a&i	str	12	220.00	210.00
18-25,000 lb. a&i	str	12	275.00	265.00
with compl yoke				
20-15,000 lb. a&i	str	18	330.00	315.00
20-25,000 lb. a&i	str	12	385.00	120.00
String conductors cm				
ACSR 3-1,158,400	mi	1	6,600	18,900
all alum, 3-954,000	mi	1	5,280	8,190
3-636,000	mi	3.6	3,630	13,125
overhead ground wire, 1/2" EHS	mi	1	1,650	965.00
7/16" HS	mi	5.7	1,210	940.00
Air navig obstruction lighting f&i	ls	job	6,600	4,300
Dismantle existing facilities	ls	job	135,850	85,000
Tools & materials, furn & deliver to Ontario Hydro	ls	job	3,850	3,700
Paint conc & plaster walls & exposed conduits	sf	350,000	0.10	0.09
ceilings	sf	200,000	0.11	0.10
met ceilings, walls, door & misc trim	sf	70,000	0.13	0.13

a&i assemble & instal
fa&e furnish, assemble & erect
uhsm unload, handle, store & move
usbl unhandle, sort, bundle & load
uhs unload, haul & store

Bituminous Highway

Nevada uses plant-mix on Carson City route; class AA concrete used in curbs

The biggest item in this 1.919 mi stretch on U. S. Highways 50 and 395, for secondary improvements to streets in Carson City, Nevada, is Class AA concrete for curbs and gutters at $40 per cu yd.

This job for the Nevada Department of Highways includes a 64 ft roadbed with 60 ft plant-mix bituminous surface and two gutters with curbs; a 43 ft roadbed with 43 ft plant-mix bituminous surface, including two 9.5 ft shoulders; and a 40 ft roadbed with 40 ft plant-mix bituminous surface, including two 8 ft shoulders.

Keith Layton is Resident Engineer of the Department of Highways at Carson City.

The $220,547 contract went to Silver State Construction Co., Fallon, Nev., on a low bid that was 19.2% below the second and 38.3% below the high of five bids.

Concrete is 3,000 psi on a 28 day test.

The contractor furnishes all materials.

Prevailing wages range from $2.30 for common labor, through $2.35 for semi-skilled, to $2.55 for skilled laborers.

The materials will be delivered to the site by truck.

The five bids on the highway project include:

1C	Silver State Constr, Co., Fallon, Nev.	$220,547
2	John L. Savage, Carson City, Nev	273,089
5	Isbell Constr. Co., Reno, Nev	357,179

Bids: 12-19-57		Quan-	Unit Prices	
Items.	Unit	tity	1 C	2
Signs	ls	job	$1,000	$3,000
Remove culvert pipe	lf	3,621	0.50	1.50
sidewalk	sy	304	0.50	3.00
curb & gutter	lf	1,887	0.50	1.00
grouted riprap masonry	sy	20	2.00	10.00
fence	lf	5,990	0.10	0.10
drop inlets	ea	21	50.00	20.00
concrete structure.	ls	job	250.00	1,000
Excavation, roadway	cy	19,591	0.38	0.80
drainage	cy	122	0.28	4.00
Borrow	cy	2,371	0.28	0.80
Overhaul yard sta	stay	84,445	0.02	0.01
yard mile	ym	6,353	0.20	0.20
Excavation, structure	cy	3,290	1.50	2.50
Backfill	cy	2,920	1.00	2.50
Water	Mgal	1,955	1.50	1.50
Roller, power	hr	39	8.00	10.00
tamping or pneumatic tired	ft hr	2,716	0.60	0.70
Base material, selected	t	41,040	0.60	0.75
Asphalt, liquid type MC-1	t	88	40.00	50.00
emulsified, MS-1	t	12	40.00	65.00
RS-2	t	8	40.00	65.00
Screenings, ½"	t	61	3.00	7.00
Asphalt cement, 120-150 penet	t	520	35.00	41.00
Aggregate, plantmix surface	t	7,488	3.25	4.50
open graded	t	1,425	6.00	8.00
Concrete, Cl AA	cy	93	85.00	100.00
Steel, reinforcing	lb	7,480	0.16	0.18
Mesh reinforcement	sy	39	0.50	2.00
Corrugated metal pipe, 12"	lf	30	3.00	4.00
24"	lf	8	6.00	6.50
CMP, metal arch, 18"x11"	lf	70	4.00	4.25
58"x36"	lf	146	16.00	18.50
72"x44"	lf	80	27.00	26.75
Concrete pipe, reinf, 12"	lf	11	3.00	4.00
15"	lf	221	3.50	4.00
18"	lf	1,674	4.25	5.00
24"	lf	140	7.00	6.00
30"	lf	83	8.00	8.00
42"	lf	2,335	14.00	16.00
Culvert pipe, relay	lf	20	2.00	1.50
Underdrain, perforated, 12"	lf	16	3.00	3.00
Drain backfill	cy	5	5.00	3.50
Grates, structural steel	lb	9,690	0.35	0.35
Grouted riprap	cy	9	30.00	60.00
Concrete, Cl AA				
curb & gutter	cy	834	40.00	40.00
sidewalk	cy	43	38.00	45.00
Fence, construct tp				
A-4B	lf	2,453	0.50	0.50
A-832-3B	lf	462	0.60	0.60
A-836-2B	lf	760	0.60	0.60
reconstruct	lf	1,877	0.40	0.30
Gate, metal drive, 16′	ea	8	75.00	115.00
Markers & guide posts, culvert	ea	73	6.00	7.00
right of way	ea	15	6.00	7.00
Monuments, reference	ea	14	10.00	8.00
Traffic bars, raised	lf	390	2.00	2.50
Lighting system, highway	ls	job	9,000	4,500
Mortar, pneumatically placed	sy	39	10.00	20.00
Miscellaneous work	*fa	job	1,450	1,450

Completion schedule: 150 working days after 1-2-58
Liquidated damages: $250/working day
***fa force account**

500′ (IN 30′ DEPTHS) PER 8-HOUR SHIFT in limestone, with 2 heavy-duty wagon drills and efficient Jaeger "600" air power. Drilling is done in 2 lifts, first to 20′, then a final 10′ lift. Lewisburg Limestone Co., Lewisburg, Tenn.

Jaeger 600 "far more efficient", *says quarry operator*

Powers 2 heavy-duty drills averaging 500′ per shift in limestone; engine speed under 1650 rpm

It takes plenty of constant 100-lb. air to power 2 heavy-duty wagon drills logging a fast 500′ in limestone, each 8-hour shift. This Jaeger "600" rotary does the job for Lewisburg limestone, with ample air reserve, at easy, fuel-saving speeds that never reach 1650 rpm. This economical, slow-running performance cuts fuel costs, saves wear and tear on engine and compressor. "Far more efficient than the compressor it replaced," reports Lewisburg Limestone.

A Jaeger Roto "600", using the same Model 6-71 GM diesel engine, produces the same 600 cfm of air as other "600" compressors at 100 to 150 rpm slower speed (1650 rpm instead of 1750 or 1800). You cut fuel costs, reduce fpm of engine piston travel and save up to 9000 revolutions every hour you operate a Jaeger "600". Smaller Roto Air-Plus® units (125, 250 and 365 cfm) have the same slow-speed, high-efficiency performance.

It will pay you to get full details and prices from your Jaeger distributor — or ask us to send Catalog JCR-5.

MAKING LITTLE ONES OF BIG ONES: Jaeger "125" rotary keeps this hand-held rock drill operating at full efficiency by producing 125 cfm of 100 psi air at only 1700 rpm, instead of the usual 1800. You save the difference, in fuel and wear.

THE JAEGER MACHINE COMPANY

200 Dublin Avenue, Columbus 16, Ohio

PUMPS • CONCRETE MIXERS • SPREADERS • FINISHERS • TRUCK MIXERS

Materials and Labor Prices Market Quotations by ENR Field Reporters

See following ENR issues for OTHER PRICES:

- Wood Products, Glass, Explosives, Chemicals: Last, Dec. 19; Next, Jan. 23
- Clay Products, Lime, Plaster, Paint, Roofing: Last, Dec. 26; Next, Jan. 30
- Wage Rates, Building Board, Lath, Insulation: Last, Jan. 2; Next, Jan. 30
- Cement, Aggregate, Ready-Mixed Concrete, Asphalt: Last, Jan. 9; Next Feb. 6

IRON AND STEEL PRODUCTS—PER 100 LBS. BASE MILL PRICES

	STRUCT SHAPES—	PLATE CARBON STEEL	REINF BARS* billet	RIVETS ½-in. structural	SHEET PILING Base	STEEL RAILS Per Net Ton Standard	STEEL RAILS Per Net Ton Light	TRACK SUPPLIES Angle Bars	TRACK SUPPLIES Std Spikes	TRACK SUPPLIES Tie Plates	TRACK SUPPLIES Track Bolts
Birmingham Area	$5.275	$5.10	$5.425	$12.25	......	$110.50	$130.00	$6.975	$9.75	$6.60	......
Chicago Area	5.275	5.10	5.425	12.25	$6.225	110.50	130.00	6.975	9.75	6.60	......
Pittsburgh Area	5.275	5.10	5.425	12.25	6.225	110.50	130.00	6.975	9.75	6.60	$14.75
Buffalo Area	5.275	5.10	5.425	12.25	6.225	110.50	130.00	6.975	9.75	6.60	14.75
Cleveland	......	......	5.425	12.25	6.225	......	......	......	......	......	14.75
Youngstown Area	......	......	5.425	......	......	......	......	......	9.75	......	......
Geneva	5.275	5.10	......	......	......	......	......	......	......	......	......
Los Angeles	5.975	......	6.125	......	6.225	......	......	......	9.75	6.75	......
Pueblo	......	......	......	......	......	......	......	69.75	9.75	6.60	......

* Fairless Works, $5.575.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LBS., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS Per 100 lb., base price 5 tons to carload lot New billet	REINFORCING BARS Rail steel	EXPANDED METAL LATHk Per 100 sq. yd., carload lots Std. diamond mesh. 3.4 lb.	EXPANDED METAL LATHk Std. ribbed 3.4 lb.
Atlanta	$9.05	9.25	$9.01t	$52.00	$57.00
Baltimore	9.45	8.45j	....	42.00	46.50
Birmingham	8.64y	8.60y	8.60y	57.00p	63.00p
Boston	9.63a	8.25	8.25	46.50	51.00
Chicago	8.79E	6.91gu	6.91gu	52.00‡	53.00‡
Cincinnati	9.18ak	9.08rs	....	43.50mn	48.00mn
Cleveland	9.01	6.89c	....	44.50‡	49.00‡
Dallas	10.25	8.50	8.50	44.00	48.50
Denver	9.90	8.95c	....	57.00n	63.00n
Detroit	9.18	7.15g	....	45.00	49.50
Kansas City	9.31a	8.10	....	49.00	60.00
Los Angeles	7.75fd	7.35	....	57.00	63.00
Minneapolis	9.08d	9.26b	9.26b	42.50	46.00
Montreal	8.70–9.00iC/8.30–9.40A	7.00/7.50FG	7.00/7.50FG	65.70h	70.20h
New Orleans	....	8.00gks	....	45.50	50.00
New York	9.45e	8.35y	8.35y	50.50n	57.00no
Philadelphia	8.80/9.00	7.80/8.00	....	42.50‡	47.00‡
Pittsburgh	8.64y	7.10y	....	46.00‡w	49.50‡w
St. Louis	9.10e	8.45c	8.45c	61.00l	62.00l
San Francisco	9.50	9.45j	....	51.00	55.00
Seattle	9.80aD	8.85e	....	63.50nr	68.00nr
Toronto	8.85*	7.85	7.85	61.60nq	66.00nq

Quantity extras, per cwt: under 100#, +$9; 100–399#, +$6; 400–999#, +3.50; 1000–1999#, +1.00; 2000–4999#, base price; 5000–9999#, −10¢; 10,000–19,999#, −30¢; 20,000–29,999#, −50¢; 30,000# and up, −70¢

EXTRAS, per cwt—♦Quantity (applies to LCL shipments only): under 1,000#, +$1.80; 1000–1999#, +$1.50; 2000–4999#, +$1.20; 5000–9999#, +90¢; 10,000–19,999#, +60¢; 20,000–29,999#, +30¢; 30,000–39,999#, +10¢; 40,000# & up, none. ♦Size†: #2 +$2.50; #3 +$1.40; #4 +$1.00; #5 +70¢; #6, #7, #8, #9, #10, #11 +50¢. ♦Bending: heavy, +90¢; light +$2.20 (except in New York City and surrounding metropolitan area where bending must be done on the job). ♦Engineering (details and placing from designs by others): over 500 tons, +45¢; 200–499 tons, +50¢ but not over $4500; 75–199 tons, +65¢ but not over $2000; 20–74 tons, +75¢ but not over $975; 5–19 tons, +85¢ but not over $300; under 5 tons, +$1.00 but not over $85. Min. charge $25. Design only: +60¢.

WELDED FABRIC REINFORCING Per 100 sq ft., carload lots fob mill

4 × 16 in., No. 8 & 10 wires—Joliet, Ill., Donora, Pa., Monessen, Pa. $3.98

4 × 12 in., No. 8 & 12 wires—Joliet, Ill., Donora, Pa., Monessen, Pa. $3.62

6 × 6 in., No. 6 & 6 wires—Joliet, Ill., Donora, Pa., Monessen, Pa. $4.17

*‡ Delivered. ** Aver. of Canadian & American. *a 2000–9999# *b 10,000–15,999#, fob city *c 20 tons or over *d 10,000–19,999# *e intermediate struct'l *f incl. delivering in free zone *g CL *h list price; dominion tax exempt; add provincial and municipal taxes *i add dominion, provincial and municipal sales taxes *j intermediate and hard grade *k fob city *l delivered; contractor to do unloading *m copper alloy *n LCL *o asphalt coated *p del. of 500 sq. yd. or more. *q 3 lb *r 2% off for cash *s 2,000–4,999# *t add 16.5¢ del. *u add 6.25¢ switch *v incl 15¢ del. *w truck lots. *y add 15¢ del. *z add 10¢ del. *A American made. *C Canadian made. *D ½% for cash. *E 30,000# or over. * F Federal tax exempt. *G add 10¢ switch.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE PRICE INDEXa	ASBESTOS CEMENT PIPE per lin. ft. f.o.b. city 6" Pr Cl. 150	ASBESTOS CEMENT PIPE 12" Sew Cl. I	CLAY SEWER PIPE Per ft., delivered ASTM C13-54 8 in.	CLAY SEWER PIPE ASTM C13-54 12 in.	CLAY SEWER PIPE ASTM C200-55T 24 in.	CLAY SEWER PIPE ASTM C200-55T 36 in.	CLAY DRAIN TILE† Per 1,000 ft., car load lots, f.o.b. ASTM C4-55 6 in.	CLAY DRAIN TILE† 8 in.	CONCRETE SEWER PIPE§ Per ft., delivered ASTMC 14-55 12 in.	CONCRETE SEWER PIPE§ 24 in.
Atlanta	130.5	$1.56/1.64	$2.55/2.68	$.53	$.98	$.....	$......	$209.00s	$334.00	$1.55m	$4.40m
Baltimore	140.4	1.56/1.64	2.35/2.46	.665	1.28	5.08s	12.71	187.80	289.20	1.01	2.75m
Birmingham	125.8	1.56/1.64	2.55/2.68	.46	.86	3.70w	10.37w	260.00‡	440.00‡	1.25m	2.75
Boston	143.5	1.58/1.66	2.35/2.46	.763qrt	1.4715qrt	6.075qrt	......	215.40r	330.60r	1.56mg	3.47mg
Chicago	140.9	1.56/1.64	2.35/2.46	.93m	1.78m	7.52m	21.16m	220.00n	330.00n	1.30	4.00
Cincinnati	135.5	1.58/1.66	2.43/2.55	.665t	1.2825t	4.905t	12.505	240.00	370.00	.85m	3.25m
Cleveland	141.7	1.58/1.66	2.43/2.55	.567s	1.0935s	4.545t	11.7875t	155.40m	240.60m	.85m	3.50m
Dallas	137.8	1.58/1.66	2.67/2.80	.537	.955	4.382b	9.72b	......	....	1.04	2.10
Denver	148.2	1.79/1.73	2.67/2.80	.48n	.87n	3.73n	......	......	....	.75m	2.75m
Detroit	142.1	1.58/1.66	2.43/2.55	.90n	1.70n	6.80n	18.50n	164.80m	254.20m	1.10	4.05
Kansas City	138.5	1.60/1.66	2.43/2.55	.61	1.105	5.214b	11.08	275.00	485.00	.95	2.90
Los Angeles	148.6	1.65/1.73	2.35/2.46	.74bl	1.61bl	6.42bl	15.36bl	370.00l	530.00l	1.12	3.32f
Minneapolis	149.9	1.60/1.68	2.55/2.68	.86mo	1.55mo	6.70mo	......	......	......	2.13h	5.74h
Montreal	.....	....	....	1.13u	2.00u	7.50u	13.50u	288.00	545.00	1.17h	3.11j
New Orleans	133.3	1.56/1.64	2.55/2.68	.528	.983	5.10	......	210.50p	468.00	.85	2.90
New York	138.7	1.58/1.66	2.35/2.46	1.02	1.94	7.56	19.48	......	......	1.50	3.00
Philadelphia	138.0	1.56/1.64	2.35/2.46	.68	1.31	5.13v	14.25v	300.00‡	350.00‡	1.75h	4.20h
Pittsburgh	142.9	1.58/1.66	2.35/2.46	.595m	1.15m	4.73m	12.40m	190.00	295.00	1.66x	3.93x
St. Louis	136.9	1.56/1.64	2.43/2.55	.59	1.08	4.45	10.80	180.00l	380.00l	1.45il	3.10hl
San Francisco	148.6	1.65/1.73	2.35/2.46	.78d	1.69d	6.72d	16.36d	320.00l	560.00l	1.05m	3.30m
Seattle	149.0	1.65/1.73	2.35/2.46	.67b	1.33b	6.84	......	220.00c	......	1.95ky	4.75ky
Toronto	.....	....	....	.80	1.50	6.00	......	157.00	280.00	1.02	3.57

***WROUGHT STEEL PIPE** (Full standard weight) Discount from list; see footnote

Mill	2½ & 3 in., Butt Weld Black %	2½ & 3 in., Butt Weld + Galv. %	3½ to 6 in., Lap Weld Black %	3½ to 6 in., Lap Weld + Galv. %
Lorain, Ohio	16.75	0.50	......	......
Aliquippa, Pa.	16.75	3.00	6.25a	+8.00a
Sparrows Pt., Md.	14.75	1.50	......†	......†
Benwood, W. Va.	16.75	0.50	......	......
Youngstown, O.	16.75	0.50	6.25	+10.50a
Indiana Harbor, Ind.	15.75	0.50	5.25ab	+11.50a
Sharon, Pa.	16.75	0.50	......	......
Wheatland, Pa.	16.75	0.50	6.25a	+10.50a
Etna, Pa.	16.75	3.00	4.50d	+9.75d
Fontana, Calif.	3.25	+13.00	+7.25ab	+24.00ab

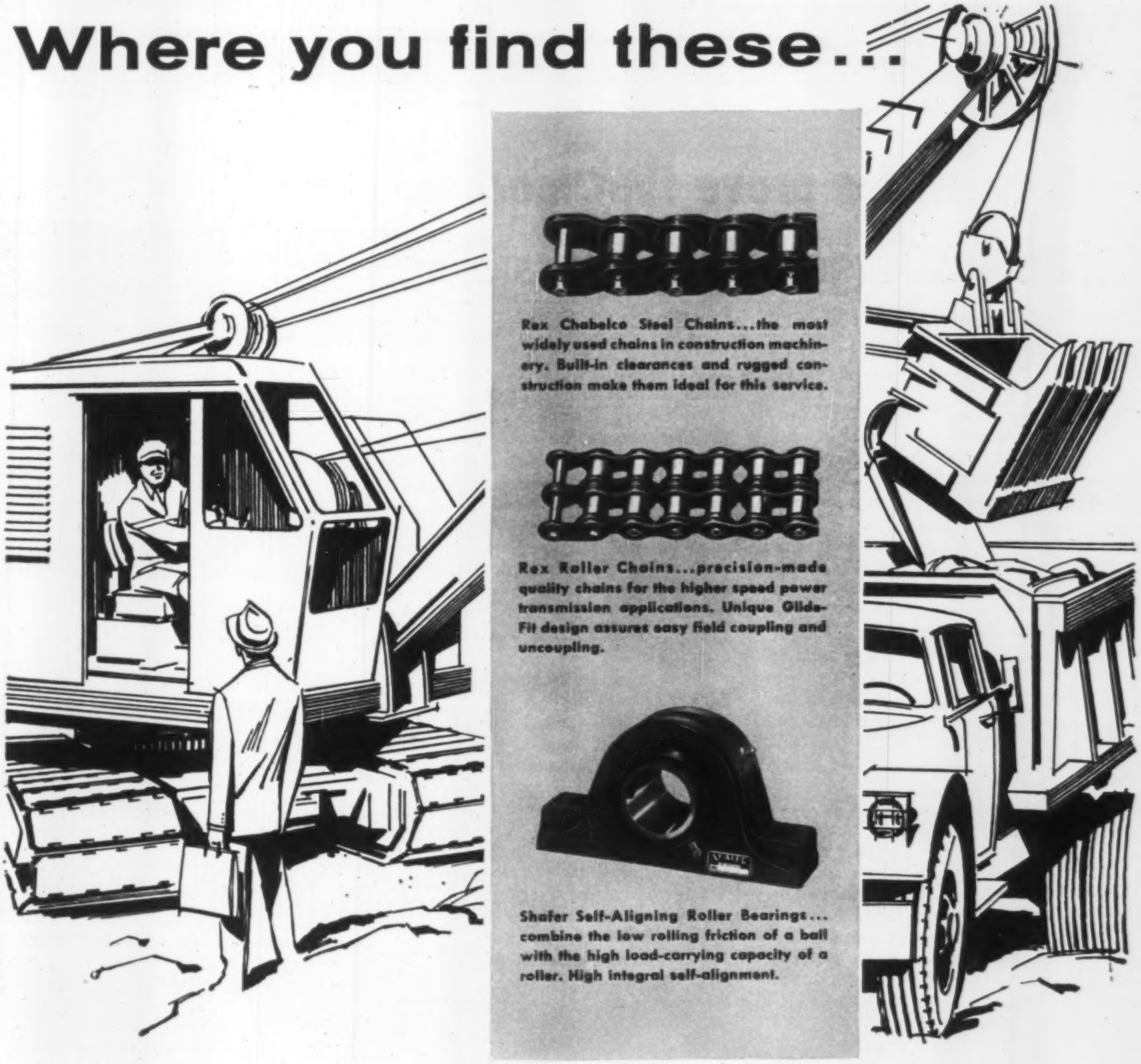
+Threaded and coupled. a 3½ to 4 in. b Continuous weld. d 5 and 6 in. † Production discontinued

*† Extra quality *‡ delivered. *a PRICE INDEXES for CENTRIFUGAL CAST IRON PIPE (Include carload freight allowed to city). These also serve as the HISTORICAL RECORD of THE $ PER NET TON PRICE of CLASS B, B&S, PIT CAST IRON PIPE. F.O.B. Foundry Price Indexes Birmingham, Ala., 125.8; Burlington, N. J., 134.6. *b Extra strength. *c 4-in., $130. *d SS361-A *f 21 in. *g culvert pipe; reinf., ASTM C 75–56 *h reinf., ASTM C 75–54 *i reinf., ASTM C 76–55 *j centrispun; no standard specs. in Canada. *k 2% cash *l fob plant *m truck del. *n LCL del., fob truck *o listed price based on LCL (no min.) *p freight allowed to destination in city *q ASTM C 13–40 *r CL fob origin, freight allowed *s 1 ft lengths *t 3 ft lengths *u CESA A 60–1941 *v standard strength *w SS; add 20% for d.s. *x fob city *y Reinforced 12 in. $1.95, 24 in. $4.75

* **WROUGHT STEEL PIPE:** Deduct discounts shown above from the following standard list consumers carload prices to get mill price. List prices per ft.("based on approx. $200 per net ton): Butt Weld ⅛ in., 5½¢; ¼ in., 6¢; ⅜ in., 6¢; ½ in., 8½¢; ¾ in., 11½¢; 1 in., 17¢; 1¼ in., 23¢; 1½ in., 27½¢; 2 in., 37¢; 2½ in., 58½¢; 3 in., 76½¢. Lap Weld 3½ in., 92¢; 4 in., $1.09; 5 in., $1.48; 6 in., $1.92. Add freight, 3% transport tax for destination price. † Production discontinued November 1957

WROUGHT IRON PIPE: List prices per ft. same as for wrought steelpipe, but add following "discounts" to get Pittsburgh mill price: Butt Weld—1 in. black, + 65.54, galv., + 95.77; 1¼ in. black, + 65.54, galv. + 95.23, 1½ in. black, + 61.79 galv. + 91.22; Lap Weld —2½ in. to 3 in. black + 67.95 galv. + 95.77; 4½ in. to 6 in. black + 64.74 galv. + 90.68 Add freight rates plus 3% transportation tax to get destination price.

Where you find these...



Rex Chabelco Steel Chains... the most widely used chains in construction machinery. Built-in clearances and rugged construction make them ideal for this service.

Rex Roller Chains... precision-made quality chains for the higher speed power transmission applications. Unique Glide-Fit design assures easy field coupling and uncoupling.

Shafer Self-Aligning Roller Bearings... combine the low rolling friction of a ball with the high load-carrying capacity of a roller. High integral self-alignment.

you're sure of PLUS value

One of the best ways to check the quality of construction machinery is to look at the component equipment in the machine...the chains and bearings, for example!

Where you see CHAIN Belt chains and bearings, you can be sure of getting the *plus* values that mean long, economical service...freedom from premature breakdowns that cause job hold-ups and lost operating hours. Rex Chabelco Chains, Rex Roller Chains and Shafer Bearings on the equipment you buy are your assurance that the manufacturer has protected his good name with another...CHAIN Belt! Look for it.

And to be sure of keeping that same quality performance through the life of the machine, buy your replacement parts from the original equipment manufacturer through his distributor. CHAIN Belt Co., 4633 W. Greenfield Ave., Milwaukee 1, Wis.

CHAIN BELT

NEW A-W ROLLER-COMPACTOR*

Three states prove that machine makes large savings possible

Deep penetration vibratory compaction and static weight surface rolling can now be accomplished in a single pass by the new A-W Roller-Compactor. On-the-job operation of this dual machine in Oklahoma, Louisiana and Pennsylvania has shown that it can make significant savings in man and equipment-hours.

The original test in Pennsylvania, which led to State approval of the machine, was carried out on a highway relocation job near Harrisburg. Preparation of the roadbed required straight excavation, with no borrow. Largest fills were 25 ft. After grading and soil compaction, stone for a 10-in. thick base was put down in a single lift. All the stone passed a 4-in. screen, 85-100% a 3½ in. Following spreading and initial compacting with the A-W Roller-Compactor, the stone was choked with screenings, 100% passing a ⅜-in. screen, 85-100% a No. 4 screen, 10-30% a No. 100.

In this operation, the static weight of the roller (10 tons) held the stone in place while the deep, penetrating action of the vibrating shoes quickly filled the voids with screenings. No auxiliary rollers were necessary.

Engineers of the Pennsylvania Department of Highways testing laboratory checked the job with inspection holes to determine if the screenings were evenly distributed throughout the thickness of the stone base and if the stone itself was firmly keyed together. This check, plus measurements based on the yield needed to compact 1 cu. yd. to the required 10-in. depth, showed that the new machine had done a job exceeding the minimum requirements. The engineers then recommended that it be approved for highway construction work in Pennsylvania.

Time studies on this job showed a saving in man and equipment-hours of better than 25% compared with methods then employed which used a single-purpose vibratory compaction unit followed by a separate 3-wheel, 10-ton roller. It was estimated that a contractor using the A-W Roller Compactor on stone base could reduce his compaction bid by 10c per sq. yd.

Spectacular results were also obtained with this machine in on-the-job operations in Oklahoma and Louisiana. For complete test details and for technical information on the A-W Roller-Compactor, see your nearby A-W distributor or write to us.

COST ANALYSIS OF A JOB IN OKLAHOMA

Equipment	No. of lifts required	Rolling time per lift (hr.)	Equipment time (total hr.)	Cost per hr.	Total cost per mile	Savings
Sheepsfoot roller and two pneumatic tire rollers	9	8	216	$12.50	$2700	—
A-W Roller-Compactor	4	11	44	$12.50	$550	$2150

This cost analysis of compaction work on soils and stabilized gravels in McCurtain County, Okla., reveals the remarkable cost reduction made possible by the A-W Roller-Compactor. Additional savings resulted because (1) Less water was required for sprinkling—the deeper lifts used with the A-W retained moisture better during compaction; (2) the roller-compactor method required only one machine and operator instead of several pieces of equipment with an operator for each; (3) motor graders and water wagons could be used more efficiently, because they could prepare material ahead of the compacting area without having to stand by for compaction of each 2-in. lift.

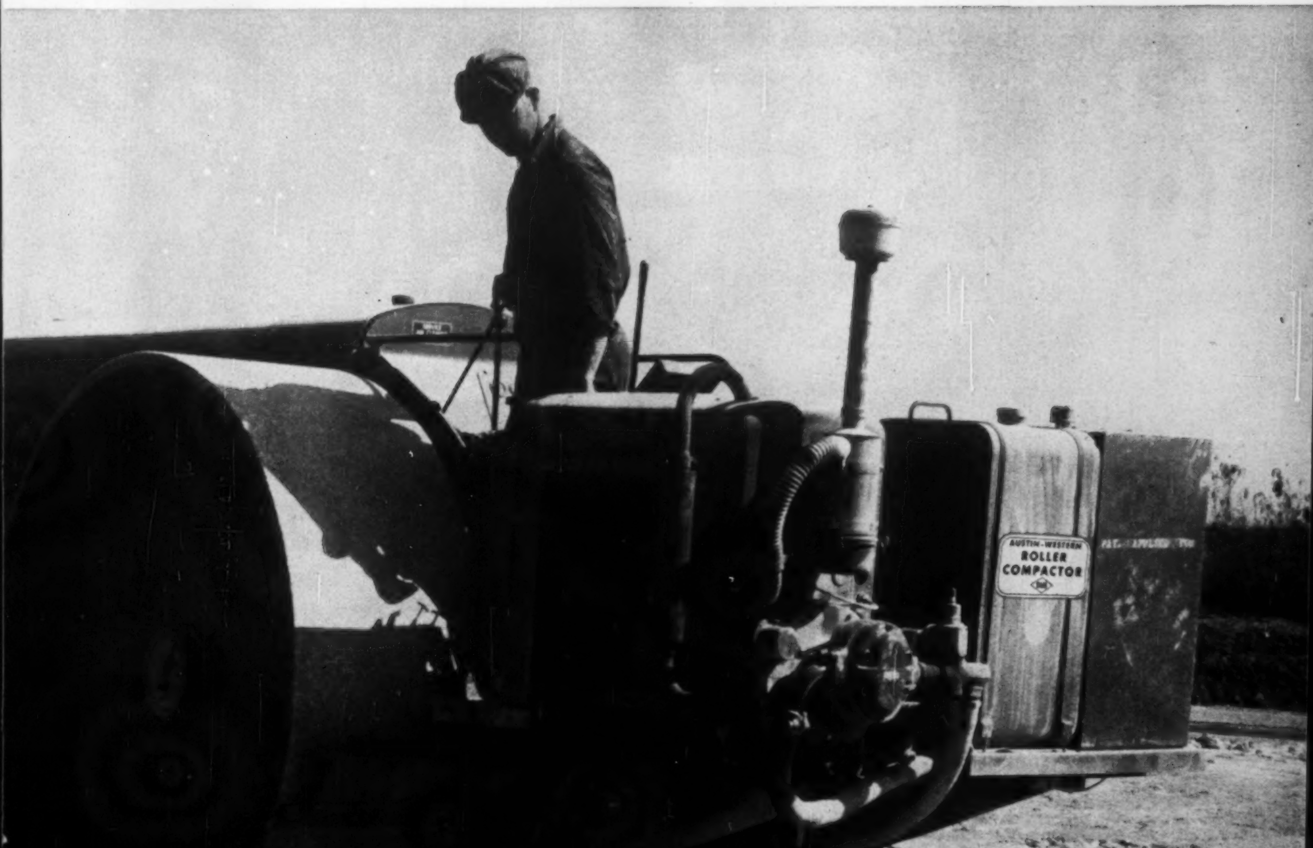
*Patents applied for

Austin-Western CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

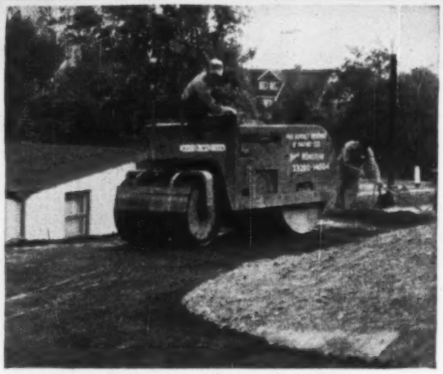
CUTS HIGHWAY BUILDING COSTS



Dual-purpose A-W Roller-Compactor serves both as vibratory deep penetration type compactor and static weight roller type surface compactor for stone, gravel and soil subbases used in the construction of highways and runways. Shown in use on a highway relocation job near Harrisburg, the machine has been approved by Pennsylvania for complete compaction of stone base aggregates up to 10 in. thick on highway construction in that state.

PGH. ASPHALT DRIVEWAY
& PAVING CO.
Phone HOMESTEAD
23200-14004
AUSTIN-WESTERN

A-W portable tandem roller, owned by Pittsburgh Asphalt Driveway & Paving Co., rolling binder layer of asphalt.



Moving in reverse, on same job.

"Our Austin-Western can take the hills and does a great job of finish rolling"

says Mr. Joseph A. Laudato, Owner, Pittsburgh Asphalt Driveway & Paving Co.

Pittsburgh Asphalt Driveway & Paving Co., Pittsburgh, Pa., specializes in driveway construction and maintenance—does anything from private home driveways to supermarket parking lots.

Bought portable tandem roller

Mr. Joseph A. Laudato, owner of the company, bought a new A-W tandem roller in January, 1957. His purchase was based on his previous experience with other A-W rollers, plus his confidence in the local distributor. Mr. Laudato says: "We use the A-W primarily to put the finish layer on asphalt, and it does an excellent job of giving it a smooth, fine level surface. The machine worked fast, too. On one job, a supermarket driveway, we finish rolled 6,300 yards of asphalt in an 8-hour shift."

Likes climbing ability

"One of the things I like best about the Austin-Western," Mr. Laudato states, "is its climbing ability. This is hilly country and a roller often has to work on a very sharp incline. To do a good job, the roller has to have steady power, otherwise you get an uneven, wavy surface. Driveways always come out smooth when our Austin-Western's on the job."

Maintenance extremely low

"To date," Mr. Laudato continues, "maintenance costs have been practically zero. You can put me down as a real Austin-Western booster."

The Austin-Western portable tandem roller is variable between 3½ to 6 tons. Tandem rollers are available in 5-8, 8-12, 10-14 ton models; 3-wheel rollers in 8-11, 10-12, 12-14 ton models. All A-W rollers are powered by your choice of gasoline or diesel engines, 4-speed or 2-speed transmissions, and torque converter. See your nearby A-W distributor. Or write us for complete information.

Austin-Western CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

BALDWIN BLH LIMA-HAMILTON

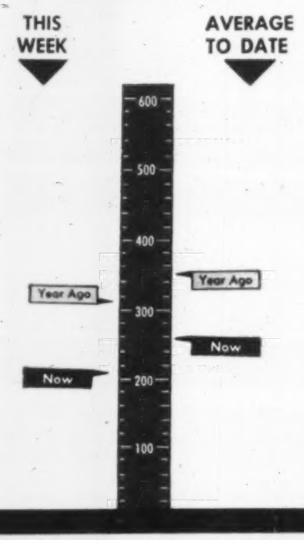
Power graders • Motor sweepers • Road rollers • Hydraulic cranes

Construction Scoreboard

ACTIVITY THIS WEEK

Contract Awards

Millions of Dollars



AMOUNT OF CONTRACTS LET

By Ownership	This Week	Cum. 7 wks 1958	Chge '57-'58
	millions		%
All Heavy Constr.	$208.7	$1,790.4	—32
Private	97.9	801.8	—32
Public	110.8	988.6	—19
State & Municipal	83.9	806.6	—11
Federal	26.9	182.0	—43
By Type of Work			
Public			
Waterworks	2.9	28.4	—38
Sewerage	5.5	76.7	+22
Bridges*	2.2	43.7	—50
Highways	36.3	275.6	—20
Earthwork, Waterways	1.0	127.8	—13
Buildings, Excl. Housing	33.0	248.9	—13
Housing	24.2	129.2	+46
Unclassified	5.7	58.2	—65
Private			
Mass Housing	44.6	258.8	—30
Commercial	22.3	211.8	+106
Industrial	29.4	287.7	—49
Unclassified	1.6	43.6	—69

* Includes private bridges.

NOTE: [1]Minimum size projects included are: Waterworks and waterways, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.

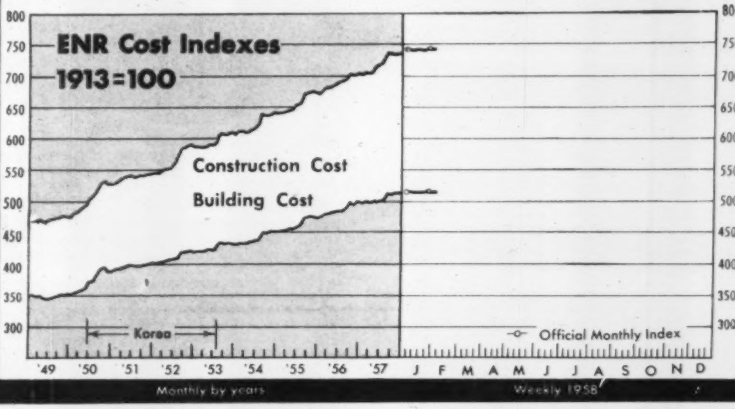
NEW CAPITAL FOR CONSTRUCTION

	Week of Feb. 6	Cum. 6 wks 1958	Chge '57-'58
	millions		%
Corporate Securities	$41.2	$437.5	—38
State and Municipal:			
All Except Housing	255.5	799.8	+34
Housing	...	1.0	...
Federal Loans	2.0	31.9	+144
Federal Aid	...	....	...
Total Nonfederal	$298.8	$1,270.1	—3
Federal Appropriations:			
Projects in U. S.	...	....	...
Outside U. S.	...	....	...
Total New Capital	$298.8	$1,270.1	—3

COST INDEXES AS OF NOW

ENR INDEXES (1913=100), 20-cities' average	Week of Feb. 6 1958	% Change from Jan. 9 1957	% Change from Feb. 7 1956
Construction Cost	743.77	+0.04	+4.9
Building Cost	515.78	—0.1	+2.8

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518



CONTRACTS AWARDED

	1958 Jan. (millions)	1958 1-Mo. (millions)	% Change from 1957 Jan.	% Change from 1957 1-Mo.
Total U. S., ENR reported	$1,258.8	$1,258.8	−24	−24
Private	521.2	521.2	−30	−30
Public	737.6	737.6	−20	−20
State and Municipal	611.3	611.3	−10	−10
Federal	126.3	126.3	−50	−50
ENR Volume Index, 1913=100	368	368	−27	−27

NEW CAPITAL FOR CONSTRUCTION

Total U. S.	$971.4	$971.4	− 5	− 5
State and Municipal Bond Sales	545.3	545.3	+23	+23
Corporate Security Sales	396.2	396.2	−30	−30
Federal Loans, Aid (nonfederal work)	29.8	29.8	+128	+128
Federal Appropriations (federal work)	0	0	0	0

* Includes funds for outside U. S.

MATERIALS SHIPMENTS

	Unit	1957 Oct. (O) Nov. (N) Dec. (D)	Cum. (No. of Mos.)	Percent Change from Year Ago Mo.	Percent Change from Year Ago Cum.
Portland Cement, Bur Mines	thous bbls	16,834(D)	289,110(12)	− 6	− 6
Conc Paving Awards, PCA	thous sq yd	11,386(D)	93,976(12)	+75	+11
Fabricated Structural Steel	thous tons	278(D)	3,652(12)	− 7	+14
Bookings, AISC	thous tons	127(D)	2,781(12)	−69	−31
Reinforcing Bars, Net, AISI	thous tons	142(N)	2,186(11)	−43	− 4
Lumber, NLMA	mil fbm	2,259(D)	33,609(12)	− 5	− 8
Orders	mil fbm	2,344(D)	33,492(12)	− 5	− 7
Production	mil fbm	2,192(D)	33,391(12)	−13	−11
Douglas Fir Plywood, DFPA, 3/8" basis					
Production (aver per week)	mil sq ft	100.1(D)	103.8(12)	+ 5	+ 4
Orders (average per week)	mil sq ft	90.8(D)	101.7(12)	− 4	+ 6
Clay Products, Bureau of Census					
Brick, Ungl, Common, Face	mil bri	602.4(O)	5,231.4(10)	+0.3	−10
Vitrified Clay Sewer Pipe	thous tons	165.1(O)	1,434.6(10)	−12	−11
Structural Tile, Unglazed	thous tons	49.3(O)	502.1(10)	−19	−13
Asphalt Products, Bureau of Census					
Asphalt Roofing	thous sales sqs	3,730.1(N)	51,022.6(11)	− 4	−10
Asphalt Siding	thous sales sqs	80.7(N)	999.3(11)	−33	−12
Aluminum, Wrought, Net, Bur Census					
Sheet and Plate (non-heat treatable)	mil lbs	65.1(N)	886.7(11)	−10	−10
Wire and Cable	mil lbs	18.8(N)	255.5(11)	−19	− 8
Extruded Shapes (soft alloys**	mil lbs	55.1(N)	598.1(11)	+ 6	+0.3

EMPLOYMENT AND FAILURES

Contract Const Employment, BLS	thous	2,833(D)	3,032(12)**	− 5	+1.3
Contractor Failures, Dun & Bradstreet					
Number		174(D)	2,105(12)	− 5	+15
Liabilities	thous	$5,713(D)	$110,312(12)	−30	+ 9

**Average per month

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager
J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, D. TARTAGLIA, Reports
J. H. WEBBER, M. R. ROESSLER, E. R. HUBER, Statistics.

NEW ENGLAND

BUILDINGS—BA

▲† **Mass., Bedford**—HOUSING—BA 2/18—Contracting Officer, Air Force Cambridge Research Center, Laurence G. Hanscom Field, 40 family type housing, Old Bedford and Nielson Rds. at Laurence G. Hanscom Field, IFB 19-604-58-40. $7,000,000. Desmond & Lord, 6 Beacon St., Boston, archts. Congdon, Gurney & Towle, Inc., 53 State St., Boston, engr. CD 1/21.

HEAVY CONSTRUCTION—LB & CA

▲ **Wexler Constr. Co., Inc.**, 118 Needham St., Newton Highlands, Mass., CA Approx. **$1,687,900**, est. $1,700,000, erecting, completing off-street parking garage, Kingston-Bedford and Columbia Sts., BOSTON, MASS. City, Real Property Bd., City Hall Annex, Boston, Mass. Bids Jan. 30. CD 2/4, under LB.

BUILDINGS—LB & CA

▲ **Poorvu Constr. Co., Inc.**, 192 Worcester St., Wellesley, Mass., LB **$1,262,800** est. $1,200,000, SENIOR HIGH SCHOOL addn., alterations, ARLINGTON, MASS. Town, Supt. Schools, 23 Maple St., Arlington, Mass. Bids Jan. 30. CD 1/7.

▲ **Pineview Acres**, East Haven, Conn., OWNER BUILDS, **$1,500,000**, 150 HOUSES, "Pineview Acres", EAST HAVEN and NORTH BRANTFORD, CONN.

▲ **Gilbane Bldg. Co.** (Central Engineering & Constr. Div.), 155 Main St., Pawtucket, R. I., CA **$1,524,990** (14 bidders) Proj. R-147, Howard H. Ellis REGIONAL TECHNICAL SCHOOL, DANIELSON, CONN. State P. Wks. Dpt., 165 Capitol Ave., Hartford, Conn. CD 1/13, under LB, Conn., Dayville.

▲ **Thomas J. Riordan Co.**, 198 Westport Ave., Norwalk, Conn., LB **$1,266,000**, HIGH SCHOOL, Bound Line Rd., WOLCOTT, CONN. Town of Wolcott, School Bldg., Comn., Woodstick School, Nichols Rd., Wolcott, Conn. Bids Jan. 24. CD 12/26.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES
February 18 Maryland

STREETS AND ROADS
February 25 Maryland

▲ **NEW YORK**—BA 2/25—Triborough Bridge & Tunnel Auth., Administration Bldg., Randalls Island, New York, Zone 35,

Bronx Co.—steel superstructure approach for Throgs Neck Bridge, Contr. No. TN-10C.

Queens Co.—steel superstructure approach for Throgs Neck Bridge, Contr. No. TN-10D. Plans deposit $30. CD 1/20/55.

BUILDINGS—BA

▲ **Pa., Pittsburgh**—AUDITORIUM—BA 2/18—At office of Public Auditorium Auth. of Pittsburgh and Allegheny Co., 1046 Union Trust Bldg., Zone 19, (1) general construction (2) plumbing, (3) heating, ventilating, air-conditioning and ice skating refrigerator (4) electrical (5) main roof-fixed and movable (6) main roof, mechanical and electrical (7) lawns and planting (8) seeding for public auditorium with retractable dome-shaped metal roof. Extended date. Mitchell & Ritchey, 1-19 Plaza Bldg., archts. CD 12/11.

▲ **N. J., Newark**—HOUSING—BA 3/11—Newark Housing Auth., 57 Sussex Ave., Housing Project N. J. 2-15, seven 12 story, bsmnt. and lobby floor bldgs., incl. 1 story, bsmnt. community and boiler bldg., Contr. 1, general constr.; Contr. 2, structural steel and misc. iron work; Contr. 3, plumbing, etc., Contr. 4, heating and ventilating; Contr. 5, electrical work; Contr. 6, electric elevators. Plans deposit $50. CD 9/12/50.

▲ **Pa., University Park** — ENGINEERING, etc. — BA 3/12—General State Auth., 18 and Herr Sts., Harrisburg, constr. engineering Bldg. and petroleum laboratory bldg. for Pennsylvania State University $4,800,000. Plans deposit $25. H. L. Shay & Assocs., Packard Bldg., Phila. Zone 2, archts. CD 9/28/56.

HEAVY CONSTRUCTION—LB & CA

▲ **NEW YORK**—State Dpt. P. Wks., Gov. Alfred E. Smith State Office Bldg., Albany, Bids opened 1/30,

N. Y.—**William Schipp**, Mahopac, N. Y. LB **$76,958** (10 bidders), reconstr. Farmers Mill bridge and approaches 0.18 mi. on Farmers Mill Rd. (County Road 402), Town of Kent, Putnam Co.;

N. Y.—**A. E. Ottaviano, Inc.**, Croton-on-Hudson, N. Y. LB **$332,970** (9 bidders), reconstr. 2 bridges and approaches the Doad Tompkins Bridge on Peekskill Hollow Road (County Road 201), and the Church St. Bridge on County Rd. 202, Town of Putnam Valley, near Adams Corners, northeast of Peekskill 0.4 mi., Putnam Co.;

N. Y.—**Hendrickson Bros. Inc.**, Valley Stream, N. Y. LB **$5,987,089** (2 bidders), elimination of 7 Long Island R.R. grade crossings in Village of Freeport at Bay View Ave., Long Beach Ave., Bergen Pl., Ocean Ave., Grove St., Main St. and Henry St. incl. 2.82 mi., Nassau Co.;

N. Y.—**Horn Constr. Co., Inc.**, 2174 Hewlet Ave., Merrick, N. Y. LB **$6,206,233** (6 bidders), elimination of 9 railroad grade crossings on Atlantic Branch of Long Island R.R. between Jamaica and Laurelton, railroad will be carried over Brinkerhoff Ave., 11th Ave., 114th Ave., New York Blvd., Foch Blvd., Baisle Blvd., Farmers Blvd., 140th Ave. and Springfield Ave. 3.86 mi., incl. pedestrian underpasses at 108 and 109 Avenues, Queens Co. CD 1/3.

▲ **NEW YORK** — State Dpt. P. Wks., Gov. Alfred E. Smith State Office Bldg., Albany, Bids opened 1/30,

N. Y.—**Arute Bros., Inc.**, 560 S. Main St., New Britain, Conn. LB **$4,928,912** (17 bidders) constr. 6.45 mi. 6-lane divided section of Northway and 5.93 mi. access roads starting at north end of new bridge under constr. over Mohawk River west of Crescent, extending northward to Rte. 146 near Clifton Park, grade separation structures will be built to carry the Dunsbach Ferry-Fort Ferry Rd., Vischers Ferry-Crescent Rd., Grooms Rd. and Sitterly Rd. over new interstate route to carry the Northway over Rte. 146 west of Clifton Park, traffic interchange facilities will be provided at Vischers Ferry-Crescent Rd. and Rte. 146, Saratoga Co.;

N. Y.—**Whitman Nurseries & Havolee Assoc., Inc.**, 236 Walt Whitman Rd., Huntington Sta., Blue Point, New York, LB **$166,952** (15 bidders), roadside planting work along 4.41 mi. section Southern State Parkway between Wantagh Ave. and Broadway, Rte. 110, Nassau and Suffolk Counties;

N. Y.—**Terry Contg., Inc.**, 31 E. 27, New York, N. Y. LB **$5,034,593** (11 bidders), 0.45 mi. 6-lane divided elevated section of Cross Bronx Expressway between Clay and Fulton Aves., incl. 1,566 ft. viaduct between Webster and Third Aves. and 0.74 mi. work on various cross streets service roads and access roads, incl. directional signs, lighting, drainage, playgrounds, utilities and roadside development, Bronx Co. CD 1/3.

▲ The **Forest Co.**, 121 No. Main St., Wharton, N. J., LB **$2,631,158**, No. 1, sewage pumping stations, force mains and collection wks., HARRISBURG, PA. Harrisburg Sewage Auth., Municipal Bldg., Harrisburg, Pa. Bids Jan. 30. CD 12/19;

Rice & Weidman, P.O. Box 1386, Lancaster, Pa., LB **$2,522,805**, No. 2, constr. sewage plant and outfall sewer (Harrisburg, Pa.);

Herre Brothers, 6th and Montrose Sts., Harrisburg, Pa., LB **$114,800**, No. 2-B, heating for No. 2 (Harrisburg, Pa.);

Keystone Engineering Co., 135 No. 5 St., Reading, Pa., LB **$147,750**, No. 2-C, electrical work for No. 2 (Harrisburg, Pa.).

▲ **United Gas Imprvt. Co.**, 14 S. Market Sq., Harrisburg, Pa. Own Forces. **$1,900,000**, gas distr. sys., incl. 10 mi. 12 in. main to tie in with pipe line near Dauphin, HARRISBURG, PA.

▲ **Steiner Constr. Co., Inc., 212 E.** Maryland Ave., Baltimore, Md., CA superstructure Fruit Terminal Pier, BALTIMORE, MD. Baltimore & Ohio R.R. Co., B. & O. Bldg., Baltimore, Md. CD 4/16, under CA.

▲† **Blackwell Engineering Co.**, Box 358, Merrifield, Va. LB **$1,250,000** (9 bidders) constr. subway, between Senate Office Bldg. and U. S. Capitol Bldg., WASH., D. C. Office of the Architect, U. S. Capitol, Wash., D. C. Bids Jan. 29. CD 1/2.

▲ **Driscoll-Moccia Constr. Co.**, 41 E. 42 St., New York 17, N. Y. LB **$12,088,575** (5 bidders) general contract Proj. NYS-73, Bushwick HOUSES, incl. 1,220 apartments in areas bounded generally by Moore St., Bushwick Ave., Flushing Ave. and Humboldt St.; Proj. NYC-33 (city) John F. Hylan HOUSES, incl. 206 apartments in areas bounded generally by Seigle St., Bushwick Ave., Moore St. and Humboldt St., BROOKLYN, N. Y. New York City Housing Auth., 299 Broadway, New York, Zone 7, N. Y. Bids Feb. 4. CD 1/9;

H. Sand & Co., 11 Park Place, New York 7, N. Y. LB **$818,200.** heating for Proj. NYS-73, Bushwick Houses (Brooklyn, N. Y);

Spitzer Elec. Co., 420 Lexington Ave., New York 17, N. Y. LB **$999,900.** electrical work for Bushwick and Hylan Houses (Brooklyn, N. Y.);

Fein-Schlosberg, Inc., 1770 Second Ave., New York 26, N. Y. LB **$1,098,000.** plumbing for Bushwick Houses (Brooklyn, N. Y.);

Armor Elev. Co., 35-45 35th St., Long Island City, N. Y. LB **$395,224.** elevators for Bushwick Houses (Brooklyn, N. Y.).

▲ **Avella Constr. Co.**, 215 E. 145 St., New York, N. Y., LB **$1,802,000** (7 bidders) general constr. CLASSROOM ADMINISTRATION BLDG. (Bldg. No. 2) at State University of New York, Harpur College, ENDICOTT, N. Y. Bids Jan. 30. CD 1/29.

▲ **Planet Constr. Corp.**, 11 W. 42 St., New York 36, N. Y., LB **$1,230,000** (8 bidders), addn., modernization Far Rockaway HIGH SCHOOL, Beach 25 St. and Ocean Creek Blvd., FAR ROCKAWAY, N. Y. Bd. Educ., Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. Bids Jan. 28. CD 1/24;

Theodore Kaish, 232 Franklin Ave., Brooklyn 5, N. Y., LB **$620,000** (7 bidders), electrical work for school (Far Rockaway, N. Y.).

▲ **John W. Cowper & Co.**, 1945 Sheridan Dr., Tonawanda, N.Y., CA **$2,547,500**, general contract East SENIOR HIGH SCHOOL for Union Free School Dist. No. 1, KENMORE, N.Y. Kenmore Tonawanda Bd. Educ., 1500 Colvin, Tonawanda, N.Y. Fenno-Reynolds-McNeil, 2000 Sheridan Dr., Kenmore, N.Y., archts. CD 6/7.

James E. Reid, 414 N. Legion, Buffalo, N.Y., CA **$355,504**, heating for high school (Kenmore, N. Y.)

▲ **John T. Brady & Co., Inc.**, 606 W. 47 St., New York 19, N.Y., LB **$2,437,000** (26 bidders), general contract Contr. B-828VI, Nassau COUNTY OFFICE BLDG.. Old County Rd. and County Seat Dr. West, Incorporated Village of Garden City, Town of Hempstead, MINEOLA, N.Y., Bd. Supervs. Nassau Co., County Old County Court House, Mineola, N.Y., Bids Jan. 28, CD 12/30;

Berwind & Co., Inc., 220 Nassau Blvd., Garden City South, N.Y., LB **$901,970** (14 bidders), Contr. B-828-V2, heating, ventilating and air conditioning of office bldg. (Mineola, N.Y.)

▲ **H. R. H. Constr. Corp.**, 16 W. 46th St., New York 19, N. Y. CA **$8,278,000.** general contract Senator Robert A. Taft HOMES (Proj. NYC-2-28) Section I, incl. Bldgs. 1 to 5 (inclusive) and Bldg. W. located in area bounded generally by E. 115 St., Madison Ave., E. 112 St. and 5 Ave., NEW YORK, N. Y. New York City Housing Auth., 299 Broadway, New York 7, N. Y. Bids Jan. 21. Grand total $10,426,597. CD 1/23, under LB;

Harry Starkman & Bros., 348 Brook Ave., New York 54, N. Y. CA **$708,800.** heating and ventilating homes (New York, N. Y.);

E. A. Kahn & Co., Inc., 163-18 Jamaica Ave., Jamaica, N. Y. CA **$650,000.** electrical work, homes (New York, N. Y.);

Lipsky & Rosenthal, Inc., Lexington Ave. and 115th St., New York 29, N. Y. CA **$789,797.** plumbing, homes (New York, N. Y.).

(Continued on page 260)

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England
Middle Atlantic
South

Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways

Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: **Before and including appointment of engineers or architects.**

BIDS ASKED: BA **(new announcements only).** For full calendar, see also preceding issues.

SOON LETS CONTRACT: SLC

LOW BIDDERS: LB **On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.**

CONTRACTS AWARDED: CA **Except awards to low bidders previously reported in low bidder stage.**

CD dates shown are of Construction Daily Issue in which last previous report was published.

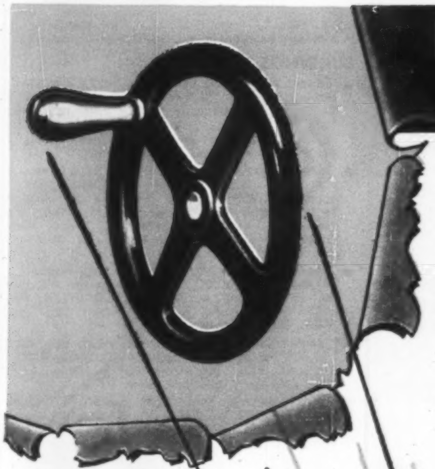
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

†	**Federal Government**
▲	Project of $1,000,000 or over.
ENR	**Engineering News-Record**
CD	**Construction Daily**

For additional reports see Construction Daily.

NO HEAD ANGLE ADJUSTMENTS TO MAKE WITH...



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Control Wheel Does Everything

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- No slides, gears or unnecessary parts to wear out
- No down time—more production time

SUPERMATIC has over 30 outstanding features found on no other masonry saw—including the Specially Designed 2 H. P. G. E. Motor... Heavy Duty Sta-Level Cutting Head with Giant Size Shaft and Housing and the All New Conveyor Cart you can't cut in two.

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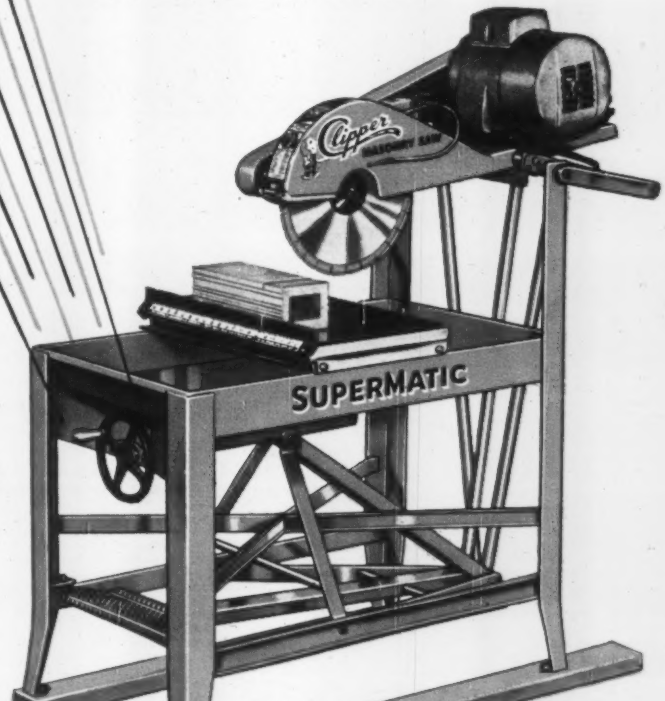

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Call Your Nearby Clipper Warehouse Collect Today for **FREE TRIAL** on a SuperMatic or Select-A-Notch Masonry Saw. Priced from **$335.**

(Continued from page 258)

▲ **N. W. Bldg. Corp.**, 309 E. 149 St., New York 51, N. Y., Owner Builds. **$1,200,000**, 6 story APARTMENT, Vine St. and McLean Ave., NEW YORK, N. Y. H. H. & Clarence Lilien, 201 W. 72 St., New York 23, N. Y., archts. CD 1/21.

▲ **Alfred & Shirley Tabor,** c/o Bankers Ltd., 60 Hamilton St., Paterson, N. J., Owner Builds. **$1,800,000,** 53 HOUSES on tract at Maple St. and Forest Hills Ave., MURRAY HILL, N. J. Samuel Malkind, 342 Madison Ave., New York, N. Y., archt.

▲ **Arthur Venneri**, 300 North Ave., East, Westfield, N. J., LB **$2,975,000**, HOSPITAL addns., alterations, SUMMIT, N. J. Overlook Hospital, 193 Morris Ave., Summit, N. J. Bids Jan. 30. CD 12/24.

▲ **Michael Lane,** 85 Central Ave., Clifton, N. J., Owner Builds, **$1,500,000,** 50 addnl. HOMES as new section of Squire Lane Houses on Tuers Place off Alexander Ave., UPPER MONTCLAIR, N. J. Rudolph Novak, 89 Central Ave., Clifton, N. J., archt.

▲ **Montgomery Constr. Co. & Assocs.**, 803 West Main St., Grove City, Pa. LB **$1,344,000.** (9 bidders), constr. SECONDARY SCHOOL for Hickory Twp. School Dist., Hickory Twp., MERCER, PA. Pa. P. School Bldg. Auth., 101 S. 25th St., Harrisburg, Pa. Bids 1/30. CD 12/26.

▲ **Joseph R. Farrell**, 4424 Market St., Phila., Pa. CA **$1,000,000,** OFFICE, LABORATORY and classroom bldg., parking area, RADNOR, PA. Matthew B. Weinstein, 1030 Lancaster Ave., Rosemont, Pa. C. Frederick Wise, 1030 Lancaster Ave., Rosemont, Pa., archt. Burroughs Corp., lessee.

▲ **George Fad**, Flourtown, Pa. Separate Contracts. **$1,110,000,** RESIDENTIAL DEVELOPMENT, Skippock Pike, CENTER SQUARE, PA.

▲ **Banks & Lee, Inc.,** Tower Bldg., Wash., D. C. LB **$2,064,000**, 2 story, brick, concrete steel block Senior HIGH SCHOOL, Oxon Hill, UPPER MARLBORO, MD. Bd. Educ. Prince George Co., Upper Marlboro, Md. Harder & Dressel, Glen Burnie, Md., archts., Perry, Lamprecht & Richard, 8 W. 25 St., Baltimore 18, Md., engrs. CD 2/14.

SOUTH

BUILDINGS—BA

▲ **Miss., Biloxi**—POST OFFICE, etc.—BA 3/6—General Services Admin., 19 and F Sts. N.W., Wash. 25, D. C., post office and court house (lease-purchase). John T. Collins, United Bldg., Biloxi, and James T. Canizaro, 112 Deposit Guarantee Bank Bldg., Jackson, Zone 1, archts. CD 1/30, under Public Bldgs.

▲† **W. Va., Huntington**—FEDERAL OFFICE—BA 3/7—General Services Admin., 19th and F Sts. N.W., Wash., D. C., federal office bldg. $3,000,000. C. E. Silling & Assocs., 314 Masonic Temple Bldg., Charleston, archts. CD 1/28.

HEAVY CONSTRUCTION—LB & CA

▲ **GEORGIA**—State Hy. Dpt., 2 Capitol St., Atlanta, Bids opened 1/31,

Ga.—**Georgia-Florida Paving Co., Inc.,** Box 85, Chiefland, Fla., LB **$774,082,** Contr. S-0618 (6), constr. 10.705 mi. wid'n. and resurf. and one bridge located in Camden Co. on what is locally known as Kingsland-St. Marys Rd. State Route No. 40, beginning at State Rte 25, in Kingsland, and ending at Dillingham St. in St. Marys, Camden Co.;

Ga.—**A. C. Pritchett Constr. Co.**, Box 248, Perry, Ga., LB **$262,201,** Contr. Fed. Aid Sec. Proj. S-1275 (1) constr. 9.944 mi. grading and paving located in county and locally known as the Vienna-Pitts Rd. State Route 215, beginning at end of present pavement approx. 3 mi. east of Vienna and extending southeast to the Wilcox Co. line, excepting 332 ft. at State Route 257, Dooly Co.;

Ga.—**Charles R. Sheppard, Inc.**, 1800 Briarcliff Rd., N. E., Atlanta, Ga., LB **$2,569,249,** Contr. No. F. A. Proj. F-006-2 (8), constr. 9.15 mi. grading and paving and 4 double bridges located in Dougherty Co. on Camilla-Albany Rd. State Route 3, U. S. 19, beginning at Mitchell County Line and extend. north on relocation to Ste. Route 60 at East Albany, Dougherty Co.;

Ga.—**R. A. Bowen, Inc.**, Box 1164, Macon, Ga., LB **$100,980,** Contr. F. A. Proj. S-1149 (1), constr. 4.975 mi. grading and paving located what is locally known as the Powersville-Lakeview Rd. FAS Route 1149, beginning at Powersville and extending easterly to State Route 11, Peach Co.;

Ga.—**Americus Engineering & Contg. Co.**, Americus, Ga., LB **$115,859,** Contr. FAP S-1735 (1), constr. 4.781 mi. grading and paving what is locally known as State Route 27 approx. 2 mi. southwest of Hawkinsville and extend. northwest to FAS Route 679, Pulaski Co.; LB **$215,655**, Contr. FAP S-1275 (2) constr. 8.543 mi. grading and paving known as Vienna-Pitts Rd. St. Route 215 beg. at end of the present pavement in Pitts and ext. northwest to the Dooly Co. line, Wilcox Co.;

Ga.—**L. A. Thigpen**, Box 213, Sylvania, Ga., LB **$174,311**, Contr. No. FAP S-0952 (3), constr. 8.637 mi. grading and paving located Newington-Hiltonia Rd., State Route 24, beginning State Route 21, in Newington and extending northeast to north of Hunter Rd., Screven Co.;

Ga.—**Ballenger Paving Co.,** Box 927, Greenville, Ga., LB **$1,705,395,** Contr. FAP 1-401-1 (13), constr. 6.183 mi. grading and divided lane paving and 3 highway grade separation, structures located on what is locally known as Adel-Tifton Rd. interstate route 401, beginning at Cook Co. line near State Route 7 and ext. north to the present contract, Tift Co.;

Ga.—**Hugh Steele, Inc.**, Box 398, Centre, Ala., LB **$3,325,466,** FAI, Proj. 1-401-1 (11), constr. 9.319 mi. grading and 4 lane paving, one double stream bridge one frontage road, double stream bridge and one double and six single highway grade separation structure located locally known Tift-Cordele Rd. beginning at the end of Proj. 1-401-1 (10) approx. 1.5 mi. south of the Tift-Turner Co. line and ext. north, Tift and Turner Counties;

Ga.—**Jefferson Contg. Co.**, Wadley, Ga., LB **$115,688,** Contr. FAP S-0787 (3), constr. 4.197 mi. grading and paving and one bridge located in Washington and Hancock Counties, locally known as Sandersville-Linton Rd. FAS route 787 beginning at end of present pavement near Linton and ext. east and southeast towards Sandersville, Washington and Hancock Counties. CD 1/22/58.

▲ **FLORIDA**—State Rd. Dpt., Tallahassee,

H. E. Wolfe Constr. Co., Box 1361 St. Augustine, Fla. CA **$1,852,373** (9 bidders) F. A. I. Proj. 1-104-1 (5) c. conc. limerock base with bit. surf. tr. limerock base with b. conc. surf. course and binder course, 3 box culverts, small drainage structures, 4 single concrete deck grade separation bridges, 5.208 mi. SR400 (Job. 1019-401), Hillsborough Co. Bids Nov. 26, awarded Jan. 28. CD 12/2, under LB.

▲ **A. C. Samford, Inc., Contractor,** Box 1229, Albany, Ga., CA **$2,105,906,** general contract HOUSING involving 240 low-rental units, GULFPORT, MISS. Mississippi Regional Housing Auth., No. VIII, John Lee Gainey, exec. dir., City Hall, Gulfport, Miss. Bids Dec. 19. CD 1/7, under LB.

▲ **LOUISIANA**—State Hy. Dpt., R. B. Richardson, dir., Hy. Office Bldg., Baton Rouge, Bids opened 1/29,

La.—**W. H. Patterson & Co.,** Box 2229, Baton Rouge, La., LB **$125,929,** shaping slopes and ditches, drainage structure, aggreg. type sub-base, stab. aggreg. type base course 4.113 mi. Roads in Ward 10, SP No. 713-04-83 (Bond Fund); LB **$144,176,** shaping slopes and ditches, drainage structures, aggreg. type sub-base stab. aggreg. type base course 4.537 mi. roads in Ward 10, SP No. 713-04-84 (Bond Fund); LB **$136,115,** shaping slopes and ditches, drainage, aggreg. type sub-base, stab. aggreg. type base course, bit. surf. treatment 4.058 mi. Roads in Ward 10, SP No. 713-04-85 (Bond Fund), all in Lafourche Parish;

La.—**T. L. James & Co., Inc.,** Box 531, Ruston, La., LB **$723,245,** c. conc. 3.141 mi. New Iberia-Jet Air Base Access Hy., Rte. LA 674, SP No. 823-29-09, Iberia Parish; LB **$332,564,** aggreg. type or soil cement base, bit. surf. treatment 9.523 mi. Charenton-Oaklawn Hy. Rtes. LA 323, SP No. 408-01-04, St. Mary Parish;

La.—**R. T. Henry**, Dubach, La., LB **$137,264,** aggreg. type or soil cement base course, bit. surf. treatment 7.712 mi. Chatham-Lapine Hy., Rte. LA 548, SP No. 323-01-04, Jackson Parish; LB **$210,145**, soil cement or aggreg. type base course, bit. surf. treatment 8.467 mi. Bastrop-Wardville Hy., Rte. LA 593, SP No. 834-12-06, Morehouse Parish;

La.—**L. T. Brown, Contractor,** P.O. Box 983, Minden, La., LB **$87,090**, aggreg. type or soil cement base course 4 mi. Marsalis-Aycock Hy., Rte. LA 518, SP No. 295-03-04, Claiborne Parish; LB **$117,598,** aggreg. type or soil cement base, bit. surf. treatment 6.452 mi. Alliance School-Zwolle Hy., Rte. LA 475, SP No. 843-02-06, Sabine Parish;

La.—**Coastal Contractors**, Box 911, Baton Rouge, La., LB **$424,537,** wid'n. existing concrete pavement, bit. hot mix surf. 9.255 mi. Lake Providence-Arkansas State line Hy., Rte. LA-US 65, SP No. 20-09-15 FAP No. F-47(4), East Carroll Parish; LB **$149,243,** wid'n. existing pavement, bit. hot mix surf. 10.019 mi. Winnsboro-Growville Hy., Rtes. LA 4 and 17, SP Nos. 36-04-19 and 51-02-09, Franklin Parish;

La.—**Campbell Constr. Co., Inc.,** P.O. Box 1758, Shreveport, La., LB **$366,805,** c. conc. base wid'n. and bit. mixture for hot application, c. conc. pavement 2.607 mi. Columbia-Riverton Hy., Rte. LA-US 165, SP No. 15-07-11, FAP No. F-14(5), Caldwell Parish;

La.—**Spohrer-Pollard Contractor**, Box 5127, Bossier City, La., LB **$3,120,564,** grading, interchange structure, c. conc. 7.721 mi. Hammond-By-Pass Hy., Rtes. LA-US 51 and I-55, SP Nos. 17-04-09 and 421-01-02, FAP Nos. F-36(7) and I-IN-510(2), Tangipahoa Parish. CD 12/27;

La.—**Capital Asphalt, Inc.**, Box 2229, Baton Rouge, La., LB **$400,021**, wid'n. existing c. conc. pavement, surf. with bit. hot mix 9.046 mi. Sun-Bogalusa Hy., Rte. LA 21, SP Nos. 30-02-11 and 30-03-07, St. Tammany and Washington Parishes;

La.—**L. H. Bossier, Inc.,** Box 1870, Alexandria, La., LB **$385,632**, grading, drainage structures, etc. 9.595 mi. Merryville-Singer Hy., Rte. La. 110, SP No. 190-01-06, Beauregard Parish;

La.—**Hall & Holland,** Box 38, Montgomery, La., LB **$518,025,** soil cement or aggreg. type base course, bit. surf. treatment 6.946 mi. Grand Coteau-Arnaudville Hy., Rte. LA 93, SP Nos. 221-01-05 and 221-02-03, St. Landry and St. Martin Parishes;

La.—**The White Constr. Co.**, Box 994, Lafayette, La., LB **$106,437,** bit. hot mix surf. 10.45 mi. Baton Rouge-Indian Mound Hy., Rte. LA 37, SP No. 254-02-15, East Baton Rouge Parish. CD 1/21;

La.—**LeBlanc Brothers**, La. Natl. Bank Bldg., Baton Rouge, La., LB **$191,301,** aggreg. type or soil cement base course bit. surf. treatment 3.922 mi. Glenwood, Westfield and Lula Rds., Rtes. LA 1007, 1005 and 999, SP Nos. 804-20-01, 804-13-03 and 804-16-08, Assumption Parish. CD 1/15.

▲ **Austin Bldg. Co.,** 1000 Singleton Blvd., Dallas, Tex. CA general contract Lieberman POWER PLANT addn., Caddo Lake, MOORINGSPORT, LA. Southwestern Gas & Electric Co., 428 Travis St., Shreveport, La. Total est. **$11,000,000;**

Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa., 114,000 kw. generator turbine for power plant (Mooringsport, La.);

Combustion Engineering Co., 208 Madison Ave., New York, N. Y., boiler for power plant (Mooringsport, La.).

▲ **Farnsworth & Chambers**, 3601 Brock St., Houston, Tex. CA **$2,474,000** municipal airport terminal, NASHVILLE, Tenn. City, City Hall, Nashville, Tenn. Bids Jan. 8, awarded Jan. 28. CD 1/14, under LB.

BUILDINGS—LB & CA

▲ **Edward M. Fleming Constr. Co.**, 4121 NW 25th St., Miami, Fla., LB **$1,999,990,** MEDICAL RESEARCH BLDG., Jackson Memorial Hospital, NW 10th Ave. and 16th St., MIAMI, FLA. University of Miami, Dr. Jay F. W. Pearson, pres., 1200 Campo Sano, Coral Gables, Fla. Bids Jan. 15, CD 12/31.

▲ **Russell Losey**, 4102 N.W. 17th St., Miami, Fla., and 1611 N. 26th Ave., Hollywood, Fla., CA Approx. **$1,750,000,** 175 RESIDENCES, N.W. 173 Terrace and N.W. 46th Ave., MIAMI, FLA. Heftler Constr. Co., 4102 N.W. 183rd St., Miami, Fla. Edwin Gerber, 1944 NE 163rd St., N. Miami, Fla., archt.

▲ **Daniel Constr. Co.**, 822 7 Ave. S., Birmingham, Ala., CA Est. **$20,000,000,** 10 mill buildings and supporting facilities at ALUMINUM REDUCTION PLANT, LISTERHILL, ALA. Reynolds Metals Co., Reynolds Metal Bldg., Richmond, Va.

▲† **Jordan Co.,** Andrews Rd., Columbus, Ga., CA **$3,520,400** for 200-unit Capehart HOUSING, FORT McCLELLAN, ALA. Dpt. Army, Fort McClellan, Anniston, Ala., Bids 10/3. CD 10/9, under LB.

▲ **W. F. Holt & Sons,** 1119 Laurel St., Nashville, Tenn., LB **$3,250,000,** est. $3,250,000, 2 story OPERATIONS BUILDING, NASHVILLE, TENN. Baptist Sunday School Bd., 127-9th Ave. N., Nashville, Tenn. Bids 1/28. CD 9/19/56.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

February 19, 21 Michigan **February 25 Wisconsin**

STREETS AND ROADS

February 19 Michigan **February 25 Wisconsin**

BUILDINGS—BA

▲ **Wis., Racine**—Y.M.C.A. BLDG.—BA 2/19—Young Men's Christian Assn., Racine, Y.M.C.A. Bldg. $2,000,000, Extended date. Grassold, Johnson & Assocs., 734 N. Jefferson St., Milwaukee, Zone 2, archts. CD 1/17.

▲ **Wis., Green Bay**—POST OFFICE—BA 3/4—General Services Admin., Public Bldgs. Service, Wash., D. C., construct and finance post office. $1,500,000. Foeller, Schober, Berners, Safford & Jahn, 310 Pine St., archts. CD 1/31.

▲ **Wis., Superior** — LABORATORY SCHOOL etc. — BA 3/6—Bd. Regents of State Colleges, State Capitol, Madison, 71 x 166 ft. science bldg. and 172 x 412 ft. laboratory school. $1,750,000. Plans deposit $25. Foeller Schober, Berners, Safford & Jahn, 310 Pine St., Green Bay, archts. CD 1/20, under LB.

HEAVY CONSTRUCTION—LB & CA

▲ **Friebel-Hartman Co.,** 59 Walnut St., Shelby, O., CA **$3,844,170** Est. $4,024,746 (12 bidders) Contr. No. 3 sewage disposal plant, MANSFIELD, O. City, City Hall, Mansfield, O. Bids Jan. 16. CD 1/23, under LB.

▲ **Johnson, Drake & Piper, Inc.,** 112 No. 7 St., Terre Haute, Ind. and **Tecon Corp.**, 1201 Main St., Dallas, Tex., LB **$8,100,000**, gymnasium; LB **$3,500,000,** stadium, BLOOMINGTON, IND. Bd. Trustees, Indiana University, J. A. Franklin, vice pres., Bloomington, Ind. Bids Jan. 30. CD 12/16;

Virginia Engineering Co., 80-29 St., Newport News, Va., LB **$1,277,000**, fieldhouse, (Bloomington, Ind.); **Huber, Hunt & Nichols, Inc.,** 2450 Stebbs St., Indianapolis, Ind., LB **$3,216,000,** gymnasium addn.; LB **$2,560,000,** site preparation (Bloomington, Ind.); **Baltimore Contractors, Inc.,** 711 S. Central Ave., Baltimore, Md., LB **$400,000**, utilities.

▲ **W. J. Sheppard & Co.,** 1412 Altgeld St., Chicago, Ill., LB **$2,083,531,** grading, paving NW Route Superhighway from W. Madison St. to W. Fulton, CHICAGO, ILL., City, City Hall, Chicago, Ill. Bids 1/30. CD 1/6.

BUILDINGS—LB & CA

▲ **Superior Constr. Co.,** 1900 E. 7 St., Gary, Ind., LB **$1,500,000,** 2 story, bsmnt. brick SEMINARY, SCHERERVILLE, IND., Capuchin Order of Franciscan Missionaries, 1740 Mount Elliott Ave., Detroit, Mich. Bids Jan. 21. CD 1/7.

▲ **M. A. Lombard & Sons Co.,** 1215 103rd St., Chicago, Ill., CA **$4,200,000,** 5 story brick HOSPITAL addn., EVERGREEN PARK, ILL. Little Company of Mary Hospital, 2800 W. 95 St. CD 10/30.

▲ **Sumner Sollitt Co.,** 307 N. Michigan Ave., Chicago, Ill., LB **$2,400,000,** 2 and 3 story, bsmnt. HOSPITAL Addn., bit. paving, brick, HIGHLAND PARK, ILL., Highland Park Hospital, 718 Glenview Ave. CD 1/2.

▲ **Dahl-Stedman Co.,** 7 S. Dearborn St., Chicago, Ill., CA **$1,000,000,** 1 story, 80,000 sq. ft. MANUFACTURING PLANT, west side of Ill. 53, PALATINE, ILL. Elgin National Watch Co., 107 National St., Elgin, Ill. Dunlap & Esgar, 333 N. Michigan Ave., Chicago, Ill., archts.

▲ **Smith & Andrews Constr. Co.,** 21110 Greenfield, Oak Park, Mich., LB **$1,013,000,** general contract HIGH

(Continued on page 262)

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(Continued from page 260)

SCHOOL, NORTHVILLE, MICH. Bd. Educ., Northville Twp. School District, 501 West Main St., Northville, Minn. Bids Jan. 20. CD 1/3.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

February 20 Kansas February 21 Missouri

STREETS AND ROADS

February 11 Missouri February 20 Kansas
February 21 Minnesota

BUILDINGS—BA

▲ **Mo., Ladue (St. Louis 24 P.O.)**—SCHOOL—BA 2/20 Ladue School Dist., Bd. Educ., Dr. Ivan C. Nicholas, supt. schools, 1201 S. Warren Rd., Ladue, Zone 24, brick, glass, masonry blocks, rein.-con. frame Junior High School. Over $1,000,000. Plans deposit $50. Murphy & Mackey, 6124 Enright Ave., St. Louis, Zone 5, archts. CD 10/24/56.

▲ **Minn., St. Paul**—STATE OFFICE—BA 3/6—State, Dpt. Admin., Director of Procurement, 19 State Capitol, St. Paul, 6 story, steel frame, 44,884 sq. ft. on each floor state office bldg. on Capitol grounds, Cedar St. between Central and Columbus Aves. inc. 3 penthouses. $7,000,000. Plans deposit $200 each, general, mechanical, electrical and ventilating. Thorshov & Cerny, Inc., 400 Metropolitan Bldg., Minneapolis, archt. CD 1/29.

▲ **Tex., Austin**—PHYSICS—BA 3/6—University of Texas, Main Admin. Bldg., 4 story, 40,000 sq. ft. physics bldg. addn. $1,000,000, Plans deposit $60, Fehr & Granger, 403 E. 15 St., archts. CD 10/22.

▲ **Neb., Omaha**—POST OFFICE, etc.—BA 3/11—General Services Admin., 19th and F Sts. N. W., Wash., D. C. post office and court house (lease-purchase), $9,130,000, Steele, Sandham & Steele, 252 Aquila Court, Henningson, Durham & Richardson, Inc., 2962 Harney St., and Kirkham, Michael & Assoc., 508 S. 19th, engrs.-archts. Bids 3/10. CD 1/30

▲ **Tex., Grand Prairie**—SHOPPING CENTER—Bids asked —Sharp & Co., Inc., 3201 Oak Grove St., Dallas, shopping center, 75 acre plot off S. Belt Line Rd. $2,500,000. CD 6/16/56.

▲ **Tex., Tyler**—FACTORY—Bids Asked—Continental Can Co., 100 E. 42 St., New York 17, N. Y., shipping container mfg. factory. $1,750,000. CD 3/7.

HEAVY CONSTRUCTION—LB & CA

▲† **Martin K. Eby Constr. Co.**, 610 N. Main, Wichita, Kan. LB **$5,117,192**, est. $5,881,329 (16 bidders) spillway at Tuttle Creek Dam and Reservoir on Big Blue River near Manhattan, ENG-23-028-58-25, KANSAS. U. S. Eng., Federal Office Bldg., Kansas City 6, Mo. Bids Feb. 4. CD 1/20.

▲† **Hyde Constr. Co.**, 1804 N. Mill St., Jackson, Miss., and Cook Constr. Co., Hy. 80 W., Jackson, Miss., CA **$3,318,432**, est. $4,356,555, constr. Fort Cobb Dam, Washita Basin Proj., near Fort Cobb, Spec. DC 4988, OKLAHOMA, Bureau Reclamation, Dpt. Interior, Anadarko, Okla. Bids Jan. 9. CD 1/14, under LB.

▲† **R. D. Lowman, Inc.**, General Contractor, Inc., Box 7155, Annex Station, El Paso, Tex., CA **$1,374,265**, Schedule A & F, G.M. Range Training Facilities, ENG-29-005-58-15, Fort Bliss, EL PASO, TEX. U. S. Eng., P.O. Box 1538, Albuquerque, N. M. Bids Jan. 21. Grand total $3,017,246. CD 1/7;

Burn Constr. Co., Inc., 142 S. Water, Las Cruces, N. M., CA **$277,285**, Schedule B, G. M. Range Training Facilities (El Paso, Tex.);

Hugh McMillan, Inc., 4201 Alabama, El Paso, Tex., CA **$991,188**, Schedule "E", CA **$175,437**, Schedule C and CA **$199,071**, Schedule D, G. M. Range Training Facilities (El Paso, Tex.).

▲ **COLORADO**—State Hy. Dpt., 4201 E. Arkansas St., Denver,

H & E Lowdermilk, Inc., Pine St., Englewood, Colo. CA **$1,055,567**, Contr. Colo. Proj. F-022-2 (13), plant mixed b. conc. surf. 6.544 mi. State Hy. No. 10, beg. at Piedra River and going West, Pagos Springs, Archuleta Co. Bids Feb. 4. CD 1/28.

▲ **COLORADO**— State Hy. Dpt., 4201 E. Arkansas St., Denver,

Roberts Constr. & Western Paving, 5105 Washington, Denver, Colo. CA **$2,012,745**, Contr. Colo. Proj. 903-1 (5), grading, structures and c. conc. 12.972 mi. State Hy. No. 2, Weld and Morgan Counties. Bids Feb. 5. CD 1/28.

BUILDINGS—LB & CA

▲ **Kraus-Anderson, Inc.**, 501 South Eighth St., Minneapolis, Minn. CA **$1,500,000.** general contract modernize, reface exterior, etc., STORE, Nicollet Ave. between Fifth and Sixth Sts., MINNEAPOLIS, MINN. J. C. Penney Co., Inc., Department Stores, District Office, 2025 Nicollet Ave., Minneapolis, Minn. Bids Jan. 21. CD 1/22, under Baker Properties, Inc. and J. C. Penney Co., Inc., as owner.

▲ **Martin K. Eby**, 610 N. Main St., Wichita, Kan., CA **$1,363,831**, est. $1,690,000 (12 bidders) constr. POST OFFICE and COURT HOUSE (lease-purchase), COUNCIL BLUFFS, IOWA. General Services Admin., General Services Bldg., Wash., D. C. Bids Jan. 28. CD 2/4, under LB.

▲ **Universal Constr. Co.**, 1202 Southwest Blvd., Kansas City, Kan., LB **$1,816,000** (8 bidders), construct and finance part bsmnt. part 2 story, part 4 story, penthouse 80,200 sq. ft. concrete, steel constr., brick facing, POST OFFICE and COURT HOUSE, 7th and Armstrong St., KANSAS CITY, KAN. General Services Admin., Deputy Regional Dir., Region 6, 2306 E. Bannister Rd., Kansas City 14, Mo. Joseph W. Radotinsky, 1401 Fairfax Trafficway, Kansas City, Mo. archts. Bids Jan. 31. CD 12/19.

▲ **Inwood Constr. Co.**, Dallas, Tex., c/o Trinity Universal Bldg., CA **$1,100,000** est. $750,000, 217,000 sq. ft. 360 x 516 ft. steel, masonry SERVICE CENTER in Brook Hollow Industrial Center, DALLAS, TEX. Sanger Brothers Dept. Store, Main and Lamar Sts., Dallas, Tex. CD 1/23.

▲† **C. H. Leavell & Co., and Don Ponder**, 1900 Wyoming St., El Paso, Tex., CA **$7,096,600**, 490 NCO Capehart HOUSING units, Fort Bliss, ENG-29-005-58-12, EL PASO, TEX. U. S. Eng., Box 1538 Albuquerque, N. M., Bids Aug. 23, CD 9/6, under LB.

▲ **Farnsworth & Chambers Co., Inc.**, Box 74, Houston, Tex., CA **$2,198,000**, Burrus SENIOR HIGH SCHOOL, HOUSTON, TEX. Houston Ind. School Dist., 1300 Capitol, Houston, Tex. Bids 1/16. CD 12/4.

▲ **Saint Elizabeth's Hospital**, 4514 Lyons Ave., Houston, Tex., (Admin. by Missionary Sisters of Immaculate Conception), rejected bids Sept. 26, HOSPITAL, HOUSTON, TEX. LB **$1,154,500.** Will re-advertise. CD 10/8, under LB.

▲ **C. H. Leavell & Co.**, 1900 Wyoming St., El Paso, Tex., CA **$4,017,000**, constr. FEDERAL OFFICE BLDG. (lease-purchase), ALBUQUERQUE, N. M. General Services Admin., Denver Fed. Center, Denver, Colo. Bids Jan. 1. CD 1/27, under LB.

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

STREETS AND ROADS

February 27, March 5, 6 California

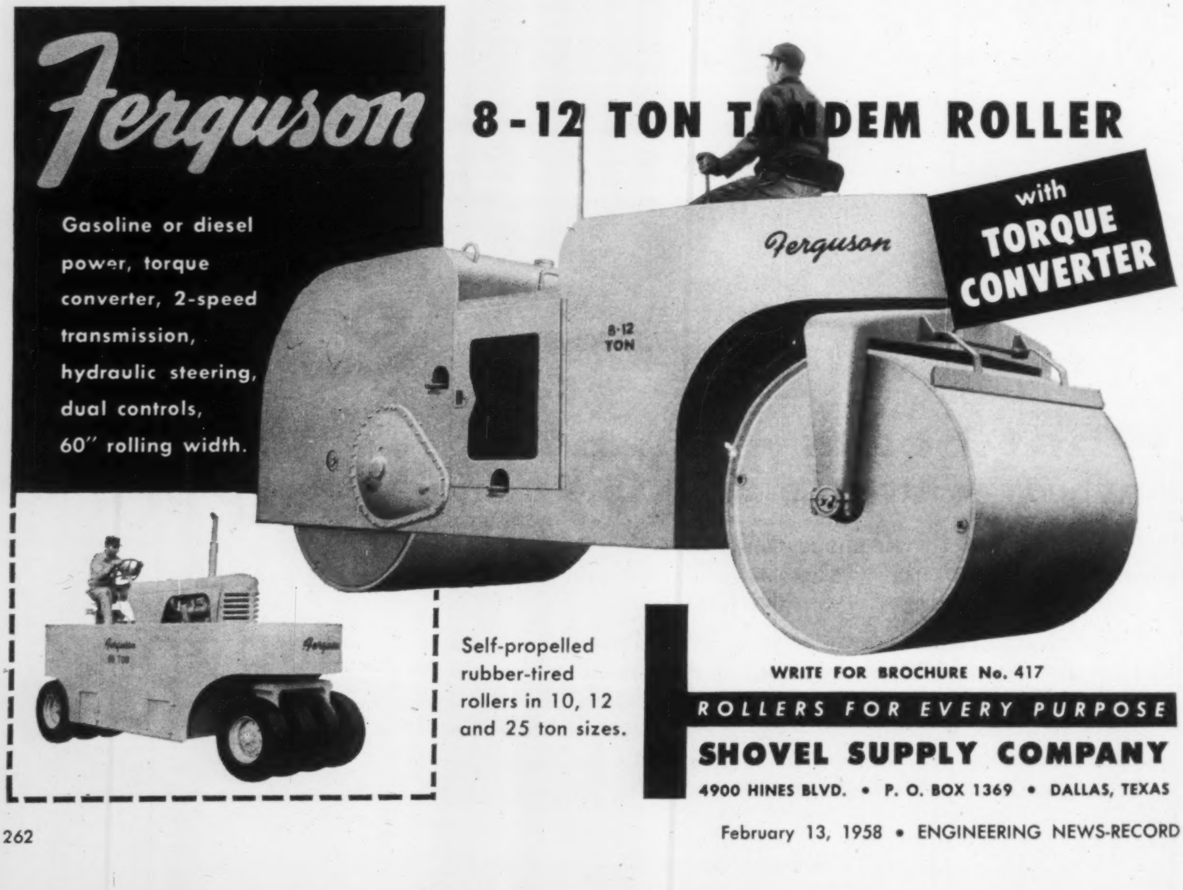
▲ **Nev., Reno**—AIR TERMINAL BLDG.—BA 2/24—City, Mayor & City Council, City Hall, 1 story, mezzanine, 42,000 sq. ft., steel frame, tilt-up constr., slab floor, air terminal bldg. $1,100,000. Plans deposit $50. Vhay & Grow, 131 W. 2nd St., archts. CD 11/20.

BUILDINGS—BA

▲ **Wash., Seattle**—SCHOOL—BA 2/26—Shoreline School Dist. 412, East 158 St. and 20 Ave. N. E., 85,221 sq. ft., frame Central Junior High School, $1,220,693, Plans deposit $30, Bindon & Wright, Hoge Bldg., Zone 4, archts. CD 9/18.

▲ **Calif., San Francisco**—OFFICE-HOTEL—BA 3/11—Jack Tarr Hotel, Charles A. Sammons, 6 St. and Boulevard, Galveston, Tex., 5 story hotel and 9 story office bldg., 10,000 sq. ft. each floor, 2 floors for parking underground, swimming pool, steel

(Continued on page 265)



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More compact—lower, shorter, lighter than competitive gasoline or diesel units. Much lighter than average diesel rig—easier to handle.

Fuel economy—uses same fuel as contractor's other equipment. Delivers more air per pound of fuel.

One responsibility — engine-compressor unit designed and built by Schramm —sales, service and all parts from your Schramm Dealer.

Lower cost—diesel operation economy at initial price of many gas-driven compressors.

Longer wear—enbloc power unit with heavy duty air cleaners on engine and compressor. Proven piston design outlasts any other method of producing power or compressing air.

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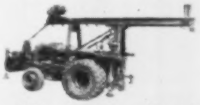
Plus features—12 volt starting, one fuel filling per day, all PNEUMADIESEL advantages with customary Schramm features.

Standard Diesel Pneumatractor

Heavy Diesel Pneumatractor



Diesel Pneumatractor Rotadrill

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(Continued from page 262)

and concrete framing. $8,000,000. Hertzka & Knowles, 85 Post St. and Thomas M. Price, 1227 Ave. L, Galveston, Tex., archts. CD 1/8.

HEAVY CONSTRUCTION—LB & CA

▲ **Pacific Bridge Co.**, 256 Montgomery St., San Francisco, Calif., CA **$1,538,660**, Schedule B, rein-con. arch-type bridge, north fork of Feather River, Butte Co., CALIFORNIA. Dpt. Water Resources, c/o Director, Rm. 401, Pub. Wks. Bldg., 1120 N St., Sacramento, Calif. Bids Jan. 29. CD 2/3, under LB.

BUILDINGS—LB & CA

▲ **Tolhoe & Harlin**, 3091 Main St., Salt Lake City, Utah, LB **$1,420,980**, est. $1,000,000, PARKING GARAGE, SALT LAKE CITY, UTAH. Auerback Co., State and Broadway, Salt Lake City, Utah. Bids Jan. 24, CD 1/20.

▲ **Fluor Corp.**, 2500 Atlantic St., Los Angeles, Calif., CA Est. **$1,000,000**, SULPHURIC ACID PLANT, ANACORTES, WASH., Allied Chemical & Dye Corp., 2999 W. 6 St., San Francisco, Calif.

▲ **Baugh Constr. Co.**, 922 Poplar Place, Seattle, Wash., CA **$1,068,000**, general contract 1 and 2 story, 75,000 sq. ft. frame, rein-con., masonry addns. to Ballard HIGH SCHOOL, SEATTLE, WASH. School Dist. No. 1, 815 4 Ave. N., Seattle, Wash. Bids Jan. 28, awarded Jan. 31, CD 1/31 under LB.

▲ **Wick Constr. Co.**, 720 North 35 St., Seattle, Wash., LB **$1,358,000** (8 bidders) general contract Northwest JUNIOR HIGH SCHOOL, SEATTLE, WASH. School Dist. No. 1, 815 4 Ave. N., Seattle, Wash. Bids Feb. 4. CD 1/10.

▲ **Ross B. Hammond**, 1241 N. Williams Ave., Portland, Ore., CA **$1,989,000**, 6 story HOSPITAL, PORTLAND, ORE. Kaiser Foundation, 2606 N.E. Broadway, Portland, Ore. Bids Jan. 10, awarded Jan. 29. CD 1/16, under LB.

▲† **Sun Gold, Inc. & Inland Empire Bldrs., Inc.**, P.O. Box 8, Riverside, Calif., CA **$11,797,800**, concrete fdns., concrete floors, wood frame and stucco, site clearing, grading, 900 FAMILY HOUSING UNITS, FORT ORD, CALIF. U. S. Eng., 180 New Montgomery St., San Francisco, Calif. Bids Sept. 5, awarded Jan. 28. CD 9/10, under LB.

▲ **Twaits Wittenberg Co.**, 507 South Bixel St., Los Angeles, Calif., LB **$3,158,000** (6 bidders) general constr. 7 story PUBLIC SAFETY BLDG., LONG BEACH, CALIF. City Council, City Hall, Long Beach, Calif. Bids 1/29. CD 12/16.

▲ **Beckner Constr. Co.**, 2650 River Ave., South San Gabriel, Calif., LB **$1,455,000** (12 bidders) Lake Hughes Junior and Senior Boys CAMP, LOS ANGELES, CALIF. Los Angeles Co., Hall of Records, Los Angeles, Calif. Bids 1/29. CD 1/2.

▲ **Palos Verdes Bldg. Co.**, 470 S. Beverly Dr., Beverly Hills, Calif. CA **$1,097,800**, 1813 sq. ft. 68 DWELLINGS, Palos Verdes Tract 21350, 1389. ROLLING HILLS, CALIF. Owner, c/o Harris & Wright, archts., 8477 Beverly Blvd., Los Angeles, Calif.

▲ **Brunzell Constr. Co.**, 3945 Higuera St., Culver City, Calif. CA Est. **$2,000,000**, 10 story wing and 2 story banquet room, steel, concrete, 180 room Miramar Hotel addn., 1132 2nd St., SANTA MONICA, CALIF. Massaglia Hotels, c/o Frank W. Green, archt., 6155 Lakeside Dr., Reno, Nev. CD 4/4/56 under Miramar Hotel, 1112 2 St., Santa Monica, Calif., as owner.

▲ **Rothschild, Raffin & Weirick**, 274 Brannan St., San Francisco, Calif., CA **$1,199,200**. (8 bidders) 9 story, bsmnt. OFFICE BLDG., Van Ness and Hayes, incl. roof parking deck, SAN FRANCISCO, CALIF., AAA Calif. State Auto Assn. c/o Exec. Vice Pres., 150 Van Ness Ave., San Francisco, Calif., Albert F. Roller, 1 Montgomery St., San Francisco, Calif., archt.

CANADA

HEAVY CONSTRUCTION—BA

STATE HIGHWAYS LETTINGS

STREETS AND ROADS
March 5, 12 Ontario

BUILDINGS—BA

▲ **Que., Valcartier**—HOUSING, etc.—BA 2/25—Central Mortgage & Housing Corp., Ottawa, Ont., M. P. McAndrew, regional constr. supt., 940 Cote de Liesse Rd., Montreal, 200 dwellings, incl. sewer, water and road services. $2,000,000. Security deposit of $500 per dwelling unit.

HEAVY CONSTRUCTION—LB & CA

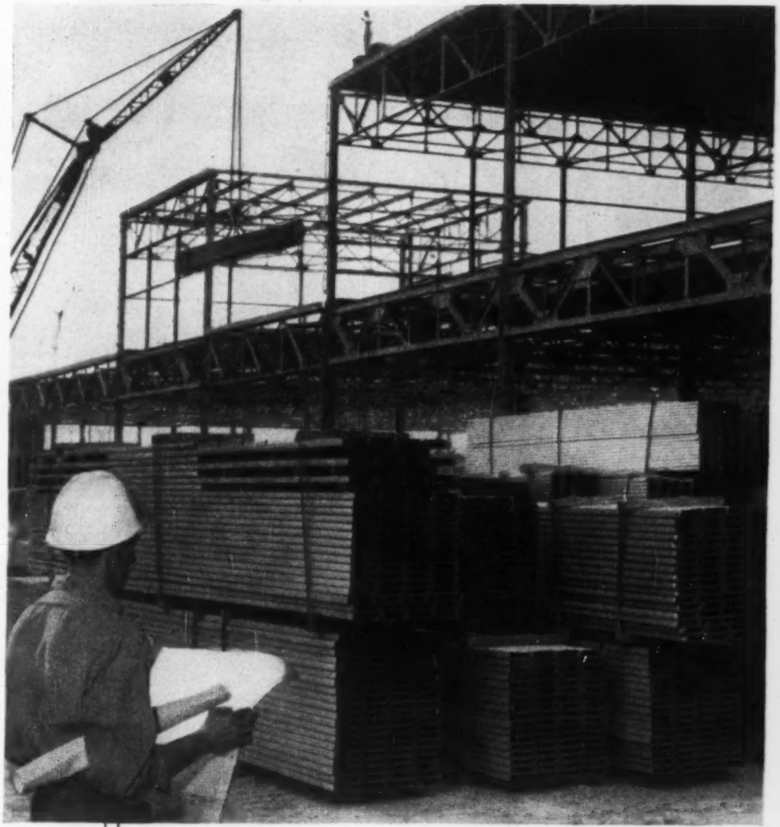
▲ **Connolly & Twizell Ltd.**, 1515 Crescent Blvd., Montreal, Que., CA **$1,468,943**, underground steam distr. system and ext. to central heating plant at Army Camp, BARRIEFIELD, ONT. Defence Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont. Awarded Jan. 30.

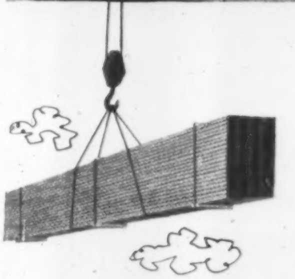
▲ **Carter Constr. Co., Ltd.**, 419 Cherry St., Toronto, Ont., CA **$1,885,000**, (9 bidders) grain elevator addn. and imprvs. to handle increased capacities made necessary by the St. Lawrence Seaway Proj., Quebec Harbor, QUEBEC CITY, QUE. National Harbors Bd., West Block Parliament Bldgs., Ottawa, Ont. Bids Dec. 19, awarded Jan. 22. CD 12/27, under LB.

BUILDINGS—LB & CA

▲ **Chester Dawe Ltd.**, Shaw St., St. John's, Newfoundland, CA Est. **$1,000,000**, HOUSING, ST. JOHN'S,

(Continued on page 268)





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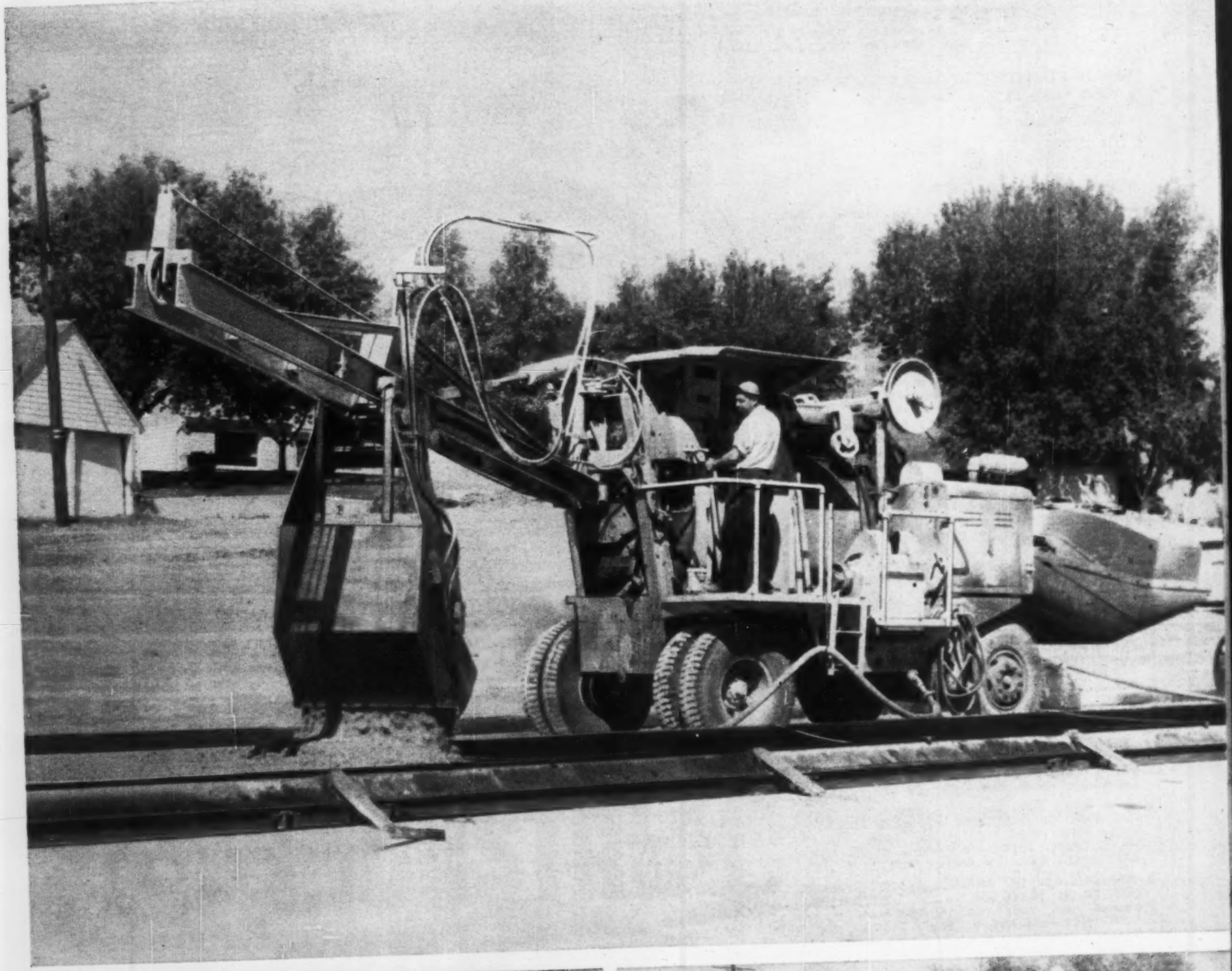

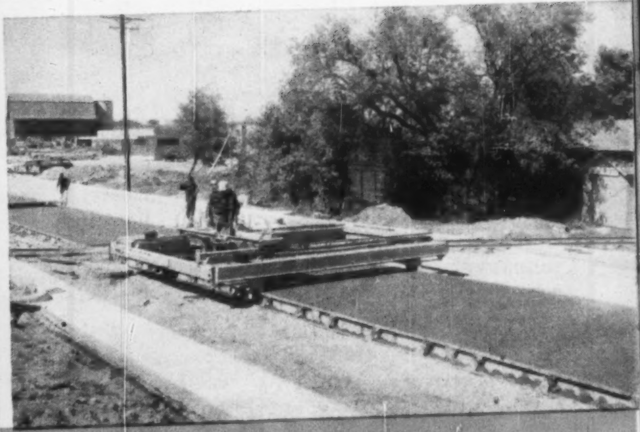

Pouring bridge pilings — On a series of 12 bridges along a new turnpike, Koehring 16-E *twinbatch* shuttled from bridge-to-bridge, pouring pilings, footings, abutments, wing-walls, and decks. Above, filling corrugated piling shells, the 16-E discharges into a chute. On work like this, bucket can be opened or closed at any time to control the rate of discharge.

"Timely" precision-finishing is important on any paving job. Operating at almost twice the speed of a 34-E paver, Koehring Longitudinal Finisher handles all practical consistencies of concrete — harsh, wet or dry. It overcomes slump difficulties on elevated curves, grades — produces smooth, mechanically accurate slab surface, with uniform crown transitions.

16-E *twinbatch*® OFFERS

a time-saving idea

FOR YOUR PAVING JOBS

On most street and highway paving, there's extra concrete to be poured in addition to the main slab — such as: center-strips, scattered intersections, curbs, gutters, culverts, approaches to driveways, bridges and sideroads. These jobs require the time-saving mobility of a rubber-tired paver — and here's an answer to the problem.

Mobile as a batch truck

With a Koehring 16-E *twinbatch* in your paving spread, you can get back on new slab *in as little as 7 days* to do clean-up work, pour adjoining slabs, or widen highway and airport strips. It works on or off-pavement, drives from one work-section to the next under its own power. Where frequent moves are involved, this saves waiting for trailer, loading and unloading delays.

For all its time-saving mobility, the Koehring 16-E *twinbatch* is primarily a production paver. On main slab work, it hits a top output of 86.7 batches an hour (based on 60-second mixing cycle). This *reserve* production capacity with Koehring *twinbatch* Autocycle mixing lets you pick up any lost time resulting from bad weather and other normal job delays.

Averages 50 yds. an hour

As a result, Koehring 16-E *twinbatch* easily maintains an average of over 76 batches an hour — 8 hours a day. Based on 16 cu. ft. per batch, plus the usual 10% overload, this assures you 50 cu. yds. of concrete per hour on straight-production paving — with a small crew.

While its usefulness is unlimited as a general-purpose paver, the Koehring 16-E *twinbatch* also serves as a mobile concrete mix plant. It discharges into overhead hoppers, forms, chutes, loads trucks. Boom elevates 60° — gives controlled discharge at 21-foot height (higher with special boom). Do you want to learn more about it? Your local Koehring distributor is the man to see. Better call on him right away.

Big 34-E *twinbatch* team working side-by-side widened runways on this military airbase, completed job "on the double". Notice how one long-boom paver reached the outside half, while the other 34-E poured the inside half of the strip. For dependable, high-production output on your major road and airport paving contracts, better look into the big Koehring 34-E.

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(Continued from page 265)

NEWFOUNDLAND. Central Mortgage & Housing Corp., Halifax, N. S., and St. John's, Newfoundland. Awarded Jan. 24.

▲ **Diana Development Ltd.**, between Sheppard Ave. and Keele St., west of Downsview Airport, Toronto, Ont. Owner Builds. **$2,500,000,** HOUSING, Diana Dr., TORONTO, ONT. Freedman & Petroff, 35 Isabella St., Toronto, Ont., archts. Alex Tobias & Assocs., Ltd., 194 Wilson Ave., Toronto, Ont., engrs.

▲ **Hurley-Gregoria Constr.**, 321 Bloor St., E., Toronto, Ont., CA Est. **$1,000,000,** (17 bidders) constr. Unit No. 2, 3 story, bsmnt., penthouse, L-shaped, 80 X 388 ft., 80 X 175 ft., rein.-con. fdns., frame, masonry walls and partitions, TRADE SCHOOL, TORONTO, ONT. Province of Ontario, Dpt. Educ., Main Bldg., Parliament Bldgs., Toronto, Ont. Bids Jan. 15. CD 12/26.

▲ **J. Kuhl & Assocs.**, c/o Bregman & Hamann, archts., 7 Adelaide St. E., Toronto, Ont., CA Est. **$1,326,000,** 2 seven story APARTMENTS, Howard and Rose Sts., TORONTO, ONT. Barbara Apartments Ltd., c/o Bregmann & Hamann, archts., 7 Adelaide St., Toronto, Ont. Farkas & Barron of Canada Ltd., 7 Adelaide St. E., Toronto, Ont., engrs. Awarded Jan. 28.

▲ **Gerard Longpre,** Percy St., between Pine and Merry Sts., Magog, Que., CA Est. **$1,250,000,** 1 story, bsmnt., 125x128 ft., brick HOSPITAL, concrete fdn., MAGOG, QUE. Hospital Magog, Inc., Paul Emile Therrien, chn., 41 Prospect St., Magog, Que. Alphonse Belanger, 46 Vimy St. N., Sherbrooke, Que., archts. Awarded Jan. 20.

ALASKA

HEAVY CONSTRUCTION—LB & CA

▲ **A. V. Phillips Co.,** 4055 21 Ave. W., Seattle, Wash. LB **$2,508,000.** (5 bidders), 90 ft. high concrete dam from bedrock at outlet of Blue Lake with concrete headworks and 1,800 ft. long, 12 ft. unlined tunnel for power and water supply, SITKA, ALASKA. City, City Hall, Sitka, Alaska. Bids Jan. 30. CD 1/16.

U. S. POSSESSIONS

BUILDINGS—BA

▲† **Hawaii, Hickam Air Force Base**—HOUSING—BA 3/20—U. S. Govt., c/o Contracting Officer, Bldg. T-243, Block 59, Hickam Air Force Base, T.H. 600 family housing units, Hickam Air Force Base, Inv. 64-605-58-132. $10,800,000. Plans deposit $200. CD 10/28.

BUILDINGS—LB & CA

▲† **Richards Constr. Co.,** P.O. Box 1187, Studio City, Calif., U.S.A., LB **$8,794,085** (12 bidders) 650 Capehart HOUSING UNITS, Marine Corp Air Station, NBy 12526, KANEOHE BAY, T.H. CD 9/21/51.

FOREIGN

HEAVY CONSTRUCTION—BA

▲ **Malaya**—Bids Asked—Central Electricity Bd., Govt. of Malaya, Kuala Lampur, Malaya, 120 ft. high power dam in Bertram River, Cameron Highlands. $3,500,000.

LATIN AMERICA

BUILDINGS—LB & CA

▲ **Dorr-Oliver, Inc.,** Barry Pl., Stamford, Conn., CA Est. **$4,500,000.** SUPERPHOSPHATE PLANT, COATZACOALCOS, MEXICO. Guanos y Fertilizantes Ing. Govt. of Mexico, Mexco City, Mexico. CD 3/1/56.

PROPOSED PROJECTS

WATER SUPPLY

▲ **Va., Harrisonburg**—City, City Hall, impounding dam at Rawley Springs area, for water supply, **$1,296,500.** Wiley & Wilson, The Courtland Bldg., Lynchburg, consult. engrs. CD 12/13.

SEWERS, WASTE DISPOSAL

▲ **Ill., Urbana**—Champaign-Urbana Sanitary Dist., Urbana, storm water drainage, **$1,550,000.** Referendum Feb. 25.

▲ **O., Avon Lakes**—Village, Town Hall, interceptor sanitary sewerage system and sewage disposal system. **$5,800,000.** Havens & Emerson, 640 Leader Bldg., Cleveland, Zone 14, consult. engrs. CD 6/28/56.

▲ **O., Dayton**—Comrs. Montgomery Co., Court House, Holes Creek Dist. sewerage system to serve 7,265 acres in Village of Centerville and Washington Twp. west of Penn R. R. from Kettering corporation line to Alexandersville, Bellbrooks Rd., incl. expansion of Moraine sewage plant, to serve and added 20,000, **$800,000;** trunk sewers, **$1,307,227;** lateral line from trunk sewers, **$1,049,000;** laterals in Centerville, **$643,971;** lines to individual lots, **$304,005,** this will cover 66 mi. of main sewage line and nearly 3 mi. force main line, and 3 pumping stations in Centerville. Total est. $4,100,000. Ralph L. Woolpert Co., 360 W. First St., consult. engr. Earl Riber, co. san. engr. CD 3/15/55.

▲ **Tex., Houston**—City, Lewis Cutrer, mayor, voted bonds Jan. 25, storm sewers, **$3,000,000;** sanitary sewers, **$4,500,000.** Frank Baldwin, Dir. P. Wks., engr. CD 1/7.

BRIDGES

▲ **PENNSYLVANIA**—Pa. Hy. & Bridge Auth., 506 North Office Bldg., Harrisburg,

Perry and Dauphin Counties—bridge to carry relocated US Rtes 11-15 over Juniata River and railroad tracks 0.37 mi. Proj. 716-1. **$2,000,000.** S. P. Longstreet, c/o owner, ch. engr. Bids soon.

▲ **Tex., Houston**—City, Lewis Cutrer, mayor, voted bonds Jan. 25, bridges, **$2,500,000;** grade separations, **$2,500,000.** CD 1/7.

STREETS AND ROADS

▲ **Mich., Pontiac**—Oakland Co. Bd. Rd. Comrs., 2420 Pontiac Lake Rd., constr. 29½ mi. road work, incl. 8-Mile Rd., 9-Mile Rd., 12-Mile Rd. and projects in Rochester and Big Beaver. **$1,112,000.** Leon V. Belknap, 2420 Pontiac Lake Rd., engr.

▲ **NEBRASKA**—State Dept. Rds. & Irrigation, Capitol Bldg., Lincoln,

Richardson Co.—9.246 mi. Portland cement from Dawson S. to Kansas Border **$1,380,000.**

▲ **PENNSYLVANIA**—State Hy. & Bridge Auth., 506 North Office Bldg., Harrisburg,

Allegheny Co.—0.39 mi. Penn-Lincoln Parkway between 10th and 22nd Sts. 3-lane pavement, ramps, walls and curbs, Proj. 810-1, FAI. **$2,111,490.** CD 8/31/51.

Armstrong Co.—4.06 mi. 4-lane divided hy. L.R. 71-R3 between Worthington and Kittanning Boros. Proj. 725-1, **$1,300,000.**

Bedford Co.—5.48 mi. L.R. 39-9 (U.S. 30) 4-lane divided road from 0.4 mi. east Everett boro to 0.1 mi. west bridge over Raystown Branch of Juniata River. Proj. 709-1, **$2,700,000.**

Bucks Co.—2.41 mi. 4-lane divided hy. L.R. 1000-1 from Delaware Expressway & Pennsylvania Turnpike interchange near Bristol north to Rodgers Rd. near Tullytown, Proj. 816-1, FAI. **$6,848,080.**

Cambria Co.—9.5 mi. L.R. 314-3; 52-19; 854-6, 4½ lane divided hy. Ebensburg By-pass, Rte. 22 from west of Mundy's Pass to east of Ebensburg, Proj. 711-1, **$4,450,000.**

Dauphin Co.—0.67 mi. 4-lane viaduct for bridge approach over Paxton Creek, city streets and 2 railways, L.R. 767-2 from Susquehanna River South Bridge to 15 St. section Harrisburg Expressway, Proj. 813-1 FAI. **$7,076,350.**

Lackawanna and Susquehanna Counties—11 mi. 4-line divided hy. L.R. 1001-2 from L.R. 322 & 35033 Jordon Hollow to L.R. 365 north of Lennox, Proj. 819-1, FAI. **$7,989,420.**

Lycoming Co.—1.32 mi. L.R. 240-4, 2-lane road, grade separation and bridge over Susquehanna River, Muncy Creek Twp., Proj. 715-1, **$2,400,000.**

(Continued on page 271)

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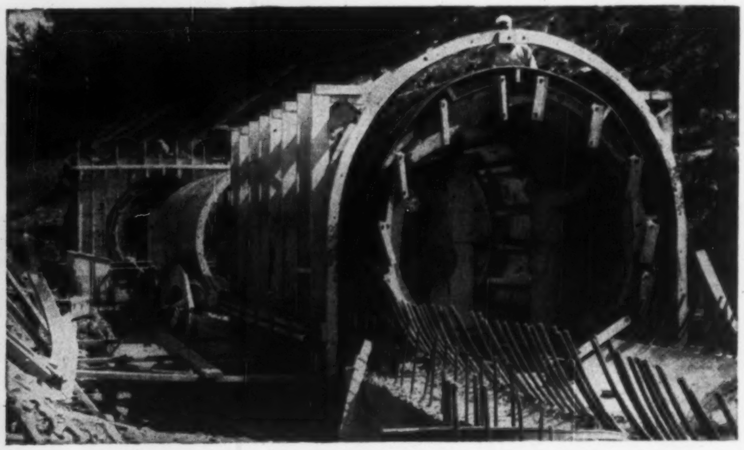
- Telescoping and Non-Telescoping Forms For Tunnels, Sewers and Conduits
- Air Locks and Lock Doors For Concrete Bulkheads
- Jumbos for Drilling, Timbering and Concreting
- Head Frames, Cages, Special Muck Cars, Self-Dumping Skips, and Muck Bins
- Special Equipment For Underground Construction



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MACHINE	Shovel Capacity	AVAILABLE AS . . .			
		Hoe	Crawler Crane	Truck Crane	Special Crane
35-M	¾	Yes	Yes	Yes	—
43-M	1	Yes	Yes	Yes	—
362	1½	Yes	Yes	—	Yes
93-M	2½	Yes	Yes	—	Yes
101-M	3	—	Yes	—	—
111-M	4	—	Yes	—	—

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☐ Have a salesman call.

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Tallest TV Tower in New England

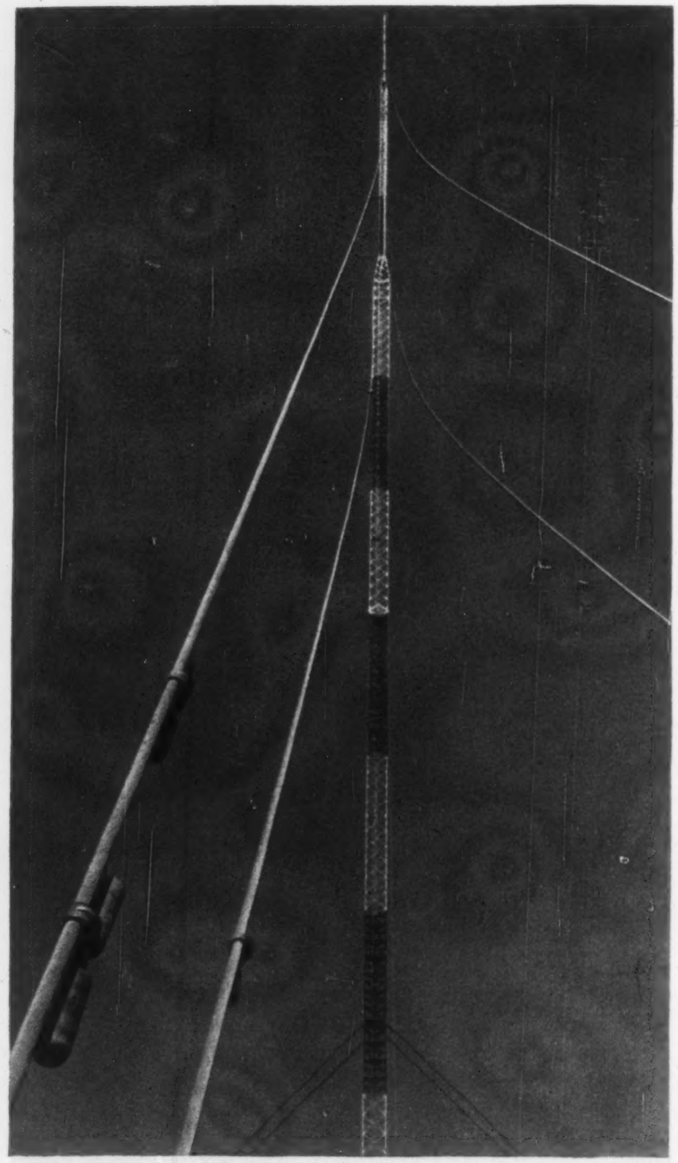
Supported by 22,200 feet of

Tiger Brand Guy Lines

The new 1199-foot WBZ-TV Tower, Boston, Massachusetts, is already the tallest in New England and is designed for later extension to an over-all height of 1499 feet. This would exceed the height of the Empire State Building by 27 feet. When the tower is extended, it will carry three TV antennas on top and three FM antennas, side-mounted.

A major problem was to design the 320-ton tower to withstand extreme wind velocities up to 165 mph. This was solved by supporting the tower with 24 Tiger Brand Galvanized Guy Lines 1⅞″ and 1$\frac{7}{16}$″ in diameter. These are anchored in concrete weighing up to 1000 tons and extend as far as 890 feet from the tower base.

For engineering help in designing tall towers, come to American Steel & Wire.



New 1199-foot tower for station WBZ-TV, Boston, Mass. Designed and fabricated by Dresser-Ideco Company, Columbus, Ohio

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USS AMERICAN TIGER BRAND WIRE ROPE

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UNITED STATES STEEL

(Continued from page 268)

McKean Co.—6.52 mi. 2-lane road, 2 bridges, L.R. 95-13 from 0.4 mi. west of Mt. Jewett to 1 mi. northeast of L.R. 601. Proj. 713-1, **$970,000.**

Monroe Co.—3.2 mi. 4-lane divided hy. from L.R. 794-1A. Stroudsburg by-pass for US 611, incl. 3 bridges, 6 grade separations (secton from L.R. 45050 to near Prospect St., East Stroudsburg). Proj. 817-1, FAI. **$4,565,390.**

3.64 mi. L.R. 169-14A, 2-lane pavmnt. and grade separation from 1.4 mi. west of Tobyhanna-Coolbaugh Twp. line east to Kinney Ave., Mt. Pocono Boro, Proj. 721-1, **$1,400,000.**

3.8 mi. 4-lane divided hy. L.R. 794-1B, Stroudsburg by-pass for U.S. 611, incl. 1 bridge, 1 railway-waterway, 3 grade separations (section from near Prospect St., East Stroudsburg to 0.32 mi. north of Delaware Water Gap Bridge), Proj. 818-1, FAI. **$6,848,080.**

Perry and Dauphin Counties—5.25 mi. 4-lane divided hy. Duncannon by-pass for Rtes. U.S. 11-15 from Kinkora Heights north to 1 mi. north of Amity Hall, Proj. 717-1, **$6,600,000.**

Philadelphia Co.—convert Vare Ave. from 28 St. to Tasker Sta. 0.83 mi. 6-lane road with local service frontage roads, curbs and sidewalks to limited access, Proj. 814-1, FAI. **$3,994,720.**

Schuylkill Expresway from 0.2 mi. south of Walnut St. under South St. to University Ave. Bridge, 0.66 mi. roadway on structure, incl. ramps, Proj. 815-1, FAI. **$6,848,080.** CD 9/17/51.

L. R. 67012-4, Schuylkill Expressway from 28 St. southeast to incl. 26 St. underpass at its crossing with Passayunk Ave., Proj. 123-1, FAI. **$1,369,620.** CD 9/14.

Susquehanna Co.—L.R. 1001-4. from L.R. 474 east of New Milford to Pennsylvania-New York State line 10 mi. 4-lane divided hy. (section of Scranton-Binghamton Thruway), Proj. 821-1, FAI. **$8,560,100.**

L.R. 1001-3. from L.R. 365 north of Lennox to L.R. 474 east of New Milford, 11 mi. 4-lane divided hy. (section Scranton-Binghamton Thruway), Proj. 820-1, FAI. **$9,130,770.**

Westmoreland Co.—4.48 mi. L.R. 787-1, for 4.81 mi. 4-lane divided hy. 2 bridges and 7 grade separations, Greensburg By-pass from 0.63 mi. east of L.R. 64173 to 0.15 mi. west of bridge over Radebaugh Branch of Pennsylvania R.R., Proj. 706-1, **$5,600,000.** S. P. Longstreet, c/o owner, ch. engr.

▲ **RHODE ISLAND**—State R.I. & Prov. Plants, Div. Purchase, State House, Providence,

Providence—Huntington Ave., Expressway, approx. 2 mi. from Olneyville Expressway to Reservoir Ave. **$3,200,000** Fenton G. Keyes & Assoc. 202 Washington St., Providence, consult engrs.

▲ **Tex., Houston**—City, Lewis Cutrer, mayor, voted bonds Jan. 25, bit. street surf., **$3,000,000;** permanent type street paving, **$5,000,000.** Frank Baldwin, Dr. P. Wks., engr. CD 1/7.

▲ **Tex., Laredo**—City, J. C. Martin; Jr., mayor, street paving, **$1,400,000.** CD 7/8/54.

EARTHWORK. WATERWAYS

▲ **Massachusetts**—Commonwealth of Mass., Dpt. P. Wks., 20 Somerset St., Boston, Mass., Wollaston Beach Imprvts. Phase No. 1, fill for beach, **$615,000;** Phase No. 2, seawall, **$1,200,000;** Phase No. 3, groins, **$25,000.** Total est. $1,840,000. Hayden, Harding & Buchanan, 1340 Soldiers Field Rd., Brighton, engrs. CD 6/10/55.

▲† **Pennsylvania**—U.S. Eng., 24th and Maryland Ave., Baltimore 18, Md., Stillwater Dam and appurtenances Forest City, Lackawanna River, **$2,000,000;** water filtration plant at Stillwater Reservoir. Gannett, Fleming, Corddry & Carpenter, 600 N. 2nd St., Harrisburg, consult. engrs. CD 9/10.

AIRPORTS

▲ **Tex., Houston**—AIRPORT—City, Lewis Cutrer, mayor, voted bonds Jan. 25, airport. **$2,200,000.** CD 1/7.

▲ **Wash., Spokane**—RUNWAYS, etc.—City, City Hall, **$4,260,000** bond election Mar. 11, 2 addnl. runways, air terminal bldg., aircraft parking and loading apron, taxiways, water mains, sewers, etc., at Geiger Field Municipal Airport. CD 1/27/56.

▲ **Wash., Tacoma**—AIRPORT, City, City Hall, $350,000 bond election Mar. 11, municipal airport, **$1,600,000.** CD 12/7/55.

LATIN AMERICA

▲ **Mexico, Tijuana-Ensenada**—PLANT—Petroleos Mexicanos, Mexico City, Mexico, plans oleoduct and storage plant. **$3,000,000.** Ing: Humberto Lonega, c/o owner, engr.

AMERICANS ABROAD

▲ **Suriname**—Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa., U.S.A., Brokopondo Development, incl. dam to create 500 sq. mi. inland lake, power house and 150,000 kw. transmission lines on Suriname River, 80 mi. south of Paramaribo. The Government of Suriname will constr. access roads and sanitation. A 60,000 ton aluminum smelter near Paranam will be erected when power is available. Over **$5,000,000.**

PUBLIC BUILDINGS

▲ **Ariz., Florence**—CELL BLOCK—State Planning Comn., Phoenix, plans by Lesher & Mahoney, Title & Trust Bldg., Phoenix, cell block at Arizona State Prison. **$1,282,000.** CD 1/17.

▲ **Calif., Downey**—SCHOOL—Downey Union High School Dist., 8521 E. Firestone Blvd., plans by Harry T. MacDonald, 3635 W. Slauson Ave., Los Angeles, 75,000 sq. ft. Junior High School No. 5. **$1,500,000.**

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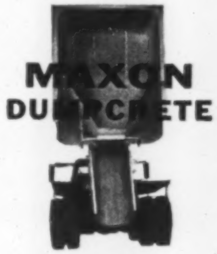

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▲ **Calif., Napa**—SCHOOL—Napa School Dist., c/o Supt., Jefferson St. and Park Ave. voted **$1,000,000** bonds Dec. 18, schools. CD 11/18.

▲ **Calif., Sacramento**—SCHOOLS—Arcade School Dist., 3501 Edison Ave., **$1,250,000** bond election Mar. 25, schools. CD 5/18/55.

† **Calif., Sacramento**—HOUSING—Headquarters, 3535th Navigator Training, U. S. Air Force, Mather Air Force Base, plans by Hugh Gibbs, A.I.A., archt.-consult. engr., 441 E. 1st St., Long Beach, design and inspection family housing, Mather Air Force Base. CD 9/19, under Airports.

▲ **Conn., Shelton**—SCHOOL—Town, Town Hall, plans by Val Carlson, 433 Howe Ave., high school, Perry Hill Rd. **$1,500,000.** CD 10/10.

▲† **Fla., Miami**—FEDERAL OFFICE—General Services Admin., Peachtree-Seventh Bldg., Atlanta, Ga., 15 story Federal Office Bldg., SE corner of Miami County Club property, **$8,500,000.**

▲ **Ga., Atlanta**—ARCHIVES BLDG.—Dpt. Archives, State of Georgia, 1516 Peachtree N.W., Archives Bldg. **$1,500,000.**

▲ **Iowa, Mason City**—SCHOOL—Bd. Educ., Bernard L. Main, secy., defeated **$1,400,000** bonds Jan. 20, Junior High School and 4 small school addns. CD 11/11.

▲ **Ky., Louisville**—SCHOOL—Louisville Bd. Educ., 5th and Hill St., plans by D. X. Murphy & Bros., Louisville Trust Bldg., Zone 2, brick, concrete West End Elementary School, **$1,000,000.** E. R. Ronald & Assoc., 554 S. 3rd St., Zone 2, consult. engrs. Bids in May.

▲† **Mass., Bedford**—CHAPEL, etc.—Veterans Admin., Munitions Bldg., Wash., D. C., plans by J. H. Ritchie & Assocs., 135 Clarendon, Boston, chapel, canteen, theater and PMR bldgs. at Veterans Hospital. **$1,000,000-$2,000,000.**

▲ **Mass., Swampscott**—SCHOOL—Town, Supt. Schools, 24 Redington St., Junior High School. **$1,650,000;** existing high school addn. **$350,000.** Constr. 1958. CD 5/29.

▲ **Mich., Croswell**—SCHOOL—Bd. Educ., Croswell-Lexington School Dist., bond election Feb. 18, high school and elementary school. **$1,350,000.**

▲ **Mich., Hillsdale**—SCHOOL—Bd. Educ., Hillsdale Schools, William Popping, supt. Schools, Junior-Senior High School. **$1,000,000.**

▲ **Minn., Columbia Heights**—SCHOOL—Bd. Educ., O. Christopherson, clk., $2,670,000 bond election Feb. 18, for Senior High School. **$2,500,000.** Toltz, King, Duvall, Anderson & Assocs., 15909 Pioneer Bldg., St. Paul, Minn., archts.

▲ **Minn., St. Paul** — OFFICE — State, Dpt. Admin., Director of Procurement, 19 State Capitol, St. Paul, plans by Thorshov & Cerny, 400 Metropolitan Bldg., Minneapolis, 6½ story, steel, etc. state office bldg. on Capitol grounds between Cedar St. and West Central Park Place. **$7,000,000.** CD 7/29/55.

▲ **Mo., Columbia**—APARTMENTS—Curators of University of Missouri, Dale Bowling, bus. mgr., 116 Jesse Hall, plans by Hellmuth, Obata & Kassabaum, Inc., 315 N. 10 St., St. Louis, Zone 1, 2 story, masonry, concrete, steel, etc. married students apartments. **$2,000,000.** CD 1/26/56.

▲ **Mont., Missoula**—NATURAL SCIENCE, RELIGIOUS CENTER—Montana State University, plans by Witwer & Price, 107 E. Main St., concrete and masonry natural sciences bldg. **$1,000,000,** bids in April. Plans by Brinkman & Lenon, Strand Bldg., Kalispell, religious center, **$750,000.**

▲† **Nev., Las Vegas**—HOUSING—Procurement Officer, Nellis Air Force Base, Las Vegas, plans by Zick & Sharp, 1806 S. Main St., 200 unit Capehart housing, Nellis Air Force Base. **$3,500,000.** CD 1/31/56.

▲ **N. J., Englewood**—SCHOOL—Bd. Educ., Englewood, plans by Scrimenti, Swackhamer & Perantoni, 205 W. Main St., Somerville, elementary school, near Glenwood Rd. **$1,015,000.** Bids in March. CD 7/18/56.

▲ **N. Y., Dobbs Ferry**—SCHOOL—Bd. Educ., plans by Ferrenz & Taylor, 1451 Broadway, New York, Zone 18, Elementary School No. 2. **$1,000,000.**

▲ **N. Y., New Rochelle**—CITY HALL—City, constr. City Hall on 6.8 acre site bounded by Manhattan Ave., The Serpentine, The Blvd. and Lawn Park. **$4,000,000.** CD 10/25/56.

▲ **O. Bedford**—SCHOOL—Bedford Bd. Educ., 91 Tarbell St., voted bonds Jan. 21, school, **$1,310,000.** Charles Bacon Rowley & Assocs., Keith Bldg., Cleveland, Zone 15, archts. CD 10/2.

▲ **O., Cleveland Heights**—SCHOOL—Cleveland Heights Bd. Educ., 1749 Lee Rd., Cleveland, Zone 18, plans by Outcalt Guenther & Assocs., 13124 Shaker Sq., Cleveland, Zone 20, high school addn. Over **$1,000,000.** CD 12/11.

▲ **O., Columbus**—SCHOOL OF NURSES—Franklin Co. Hospital Comn., Court House, plans by Louis F. Karlsberger, 24 E. Weber St., School of Nursing, **$1,082,000.** CD 12/23.

▲ **O., Twinsburg**—SCHOOL—Twinsburg Bd. Educ., bond election Mar. 11, for school addns. **$1,375,000.** CD 11/19.

▲ **O., Youngstown**—SCHOOL—Youngstown Bd. Educ., 20 W. Wood St., plans by Frank Smith, Scween-Wagner Bldg., West Junior High School. **$1,000,000.** CD 11/9/56.

▲† **Ore., Corvallis**—MAINTENANCE, etc.—U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash., automotive maintenance and storage bldgs., maintenance shop, warehouse, dispensary wing, headquarters wing and other bldgs. as major support facilities for Sage Installation at Camp Adair. **$1,800,000.** Bids probably in March.

▲ **Pa., Warren**—SCHOOL—Warren Area Jt. School Dist., Warren, secondary school. **$2,600,000.**

▲ **Tex., Deer Park**—SCHOOLS—Deer Park Ind. School Dist., voted bonds Jan. 18, elementary school **$1,000,000;** elementary school remodeling **$750,000;** gym-shop-band rooms **$500,000.** Emory S. White & Arne G. Engberg, 2017 S. Shepherd Dr., Houston, archts. CD 1/28.

▲ **Tex., Houston**—CIVIC CENTER—City, Lewis Cutrer, mayor, voted bonds Jan. 25, civic center expansion. **$2,200,000.** CD 1/7.

▲ **Wash., Bremerton**—COLLEGE—School Dist. No. 100-C, Bremerton, $1,200,000 bond election Mar. 11, Olympic Junior College addn. **$787,400.**

▲ **Wis., Sheboygan**—SCHOOL—Bd. Educ. plans by E. A. Stubenrauch & Assocs., 712 Erie Ave., high school. **$3,630,000.** CD 9/20/56.

COMMERCIAL BUILDINGS

▲ **Ala., Birmingham**—OFFICE PARK—Birmingham Realty Co., 2118 1 Ave. North, plans by Miller Martin & Lewis, Title Guarantee Bldg., Birmingham, office park on city's south side. **$10,000,000.**

▲ **Calif., Fresno**—SHOPPING CENTER—Joseph A. Romano, 6060 E. Lytell Ave., plans by Howard Schroder, Mason Bldg., shopping center, on 33 acre site, Clovis Ave. and Kings Canyon Rd. $10,000,000.

▲ **Calif., San Francisco**—HOTEL—Owner, c/o J. E. Moser, realtor, .68 Post St., 23 story, 350,000 sq. ft., 540 room hotel, California and Powell Sts. **$8,000,000.**

▲ **Ill., Aurora**—APARTMENT DEVELOPMENT—Randall Park Garden Apts., 2261 W. 111th St., Chicago, plans by Robert Soellner, 40 Plaza, Park Forest, garden apartment development, 50 bldg., 300-units, Randall Rd. and Illinois St., **$3,000,000.**

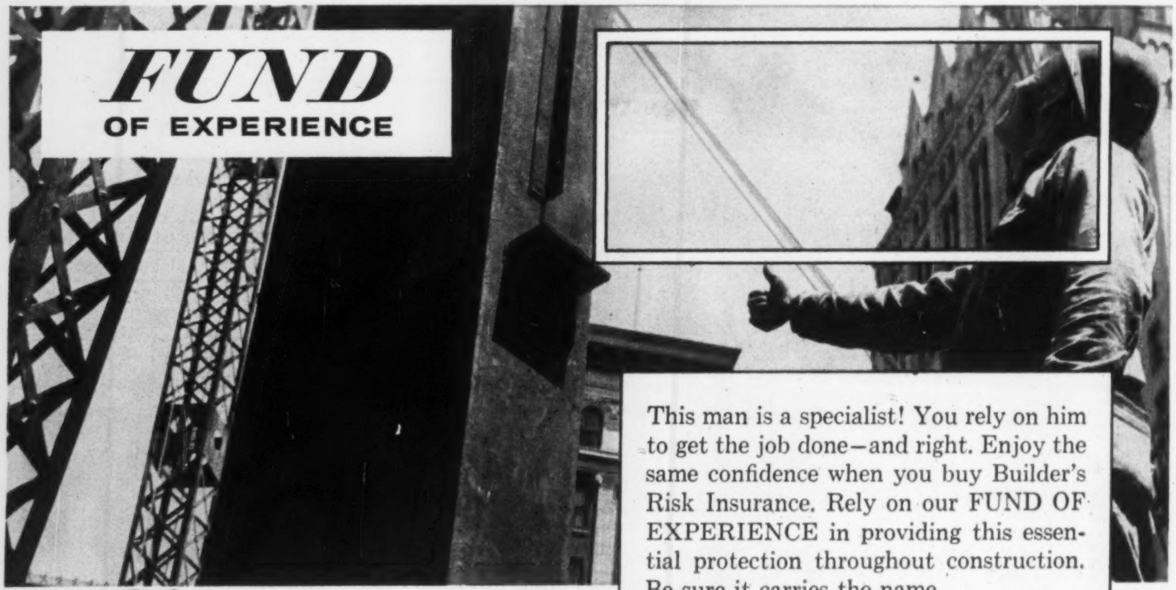
▲ **Ill., Chicago**—APARTMENT HOTEL—Owner, c/o David S. Chesrow, 134 South LaSalle St., 35 story, apartment hotel, State and E. Wacker Dr. **$4,500,000.**

▲ **Ind., Fort Wayne**—SHOPPING Center—Northcrest Shopping Center, Inc., Ralph L. Shirmeyer, pres., 120½ E. Washington St., plans by A. M. Strauss, Inc., Strauss Bldg., shopping center, U. S. 30 and State Road 427. Over **$2,000,000.** Work to start about June 1. CD 3/15/55.

▲ **Mass., West Springfield**—SHOPPING CENTER—Eastern State Shopping Centers, Inc., G. L. Mall Walk, Cross Country Circle, Yonkers, N. Y., plans by Lathrop Douglass, 518 5th Ave., New York, N. Y., Riverdale Regional Shopping Center, Rte. 5 and Ashby Ave. and Riverdale Rd. **$8,000,000.** CD 1/30.

▲ **N. Y., Brooklyn**—COOPERATIVE HOUSING—Highlawn Terrace, Inc., c/o Civil Service Technical Guild Local 375, 5 Beekman St., New York Zone 7, plans

(Continued on page 274)



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7-1004

UNITED STATES STEEL

(Continued from page 272)

by Seelig & Finkelstein, 153 Pierrepont St., Zone 2, cooperative housing, Ave. "T". **$1,883,330.** CD 1/8.

▲ **N. Y., New York**—APARTMENT—Furlang Constr. Corp., 810 Pelham Parkway South, plans by Elias K. Herzog, 258 Broadway, Zone 7, 6 story apartment, Lydig Ave. between Muliner and Bogart Aves. **$1,200,000.**

▲ **N. Y., New York**—PSYCHIATRIC UNIT—Mt. Sinai Hospital, 5 Ave. and 100 St., plans by Eggers & Higgins, 100 E. 42 St., Zone 17, 6 story psychiatric unit, 1440-58 Madison Ave. and 20 East 100 St., southwest corner of Madison Ave. and 100 St. **$3,500,000.**

▲ **N. Y., New York**—OFFICE—Western Electric Co., 195 Broadway, Zone 7, plans by Shreve, Lamb & Harmon, 11 W. 44 St., Zone 36, 31 story office bldg., 222 Broadway between Fulton and Ann Sts. **$10,000,000.** CD 9/27.

▲ **O., Akron**—SHOPPING CENTER—J. J. Bucholzer, c/o Hower Co., 974 E. Market St., shopping center, Brittain Rd. **$1,000,000.**

▲ **O., Chagrin Falls and Russell Township**—HOUSING—Applecreek Development Corp., 11 S. Franklin St., Chagrin Falls, plans by Robert A. McKenzie, 11 S. Franklin St., Chagrin Falls, 63 homes, on 93½ acre site, Over **$2,500,000.**

▲ **Tex., Brownsville**—DWELLING RETIREMENT COLONY, SHOPPING CENTER—L. D. & Norman L. Minier, 1218 E. Hy., McAllen, Tex. and F. B. Hanson, St. Catherines Ontario, Canada, 1400 dwelling retirement colony 560 acre tract, **$15,500,000;** shopping center **$1,000,000.**

▲ **Tex., College Station-Bryan**—SHOPPING CENTER—J. C. Culpepper, College Station, phase 3 shopping center off Texas Ave. near Culpepper Manor, **$3,000,000.**

▲ **Tex., Houston**—SHOPPING CENTER—Lamont Development Co., I. Redman, pres., 3314 Prospect St., shopping center near city limits Houston-Pasadena. **$1,250,000.**

▲ **Va., Alexandria**—HEADQUARTERS—Atlantic Research Corp., 901 N. Columbus St., constr. headquarters bldg. near Edsall Rd. overlooking Shirley Hy. **$1,000,000.**

▲ **Wash., Seattle**—APARTMENT—A. A. Hunt, 3005 Market St., will not constr. 11 story 124 unit steel frame Parkwood apartment bldg., 502 Olympic Place. **$1,500,000. Project abandoned.** CD 11/22.

▲ **Wis., Fond du Lac**—SHOPPING CENTER—H. Shanedling Sons Corp., 1801 Nicollet Ave., Minneapolis, Minn., will not constr. shopping center. **$1,200,000.** Project abandoned. CD 1/23/57.

▲ **Ont., Ottawa**—HOUSING, etc.—Assaly Constr. Ltd., 549 Gladstone Ave., plans by Belcourt & Blair, 233 Metclafe St., housing development, two 11 story apartment bldgs., Office Bldgs., 51 acre site, Richmond Rd. east of Hys. 15 and 17, **$20,000,000.**

INDUSTRIAL BUILDINGS

▲ **Calif., Mountain View**—LABORATORY—Sylvania Electric Products Co., c/o General Plant Mgr., Mountain View, 50,000 sq. ft. electronics laboratory adjacent to existing facilities. **$1,000,000** Constr. summer 1958. CD 6/23/53.

▲ **Fla., Miami**—BREWERY—American Brewing Co., 637 N.W. 13th St., brewery addn., 637 N.W. 13th St. **$1,000,000.**

▲ **Ill., Glenview**—LABORATORY—Kraft Foods Co., 500 N. Peshtigo Ct., Chicago, laboratory addn., Waukegan Rd. S. of Glenview Rd. **$3,000,000.**

▲ **Ind., Indianapolis**—TERMINAL, etc.—Greyhound Bus Lines, Inc., Blue Shield Bldg., plans by Daggett, Naegele & Daggett, Inc., 567 W. Westfield St., Indianapolis, Ind. and Arrasmith & Tyler, Madrid Bldg., Louisville, Ky., Greyhound bus terminal and 500 car parking ramp, Capitol and Ohio Sts., to incl. Greyhound Post House restaurant, 18 bus loading aisles, self-parking ramp type garage to be operated by Nationwide Parking, Inc. **$2,500,000.** Plans to be completed May 1. CD 4/16.

▲ **Tex., Baytown**—REFINERY UNIT—Humble Oil & Refining Co., 1216 Main St., Houston, addnl. expansion of Paraxylene Refinery unit, **$1,000,000;** some general plant modifications in refinery area. **$750,000.** CD 10/23/52.

UNCLASSIFIED

▲ **Ga., Brunswick** — DOCK FACILITIES — City — Glynn County Bd. Comrs., City Hall, Brunswick, Ga., voted bonds Jan. 21, dock facilities. **$2,000,000.**

▲† **Ohio**—NIKE SITE—U. S. Eng., New Post Office Bldg., Pittsburgh, Pa., site has been chosen near Fairport for last Nike site in Cleveland area. **$1,250,000.** Original site was to have been county airport in Richmond Heights, Cuyahoga Co. Site changed. CD 8/20/56, under LB.

▲ **O., Cleveland**—DOCK—City, Dpt. Port Control, Wm. J. Rogers, dir., City Hall, Zone 14, dock on Lakefront West of E. 9th St. **$1,800,000.** (this does not replace dock for which bids were cancelled in Oct.) Osborn Eng. Co., 7016 Euclid Ave., Zone 3, consult. engr.

▲ **O., Cleveland**—SUBWAY—Comrs. Cuyahoga Co., Court House, Zone 13, underpass on E. 222 St. at N. K. P. R R. tracks, Euclid. **$1,500,000.** Albert S. Porter, Standard Bldg., Zone 13, co. engr. CD 11/5/53.

▲ **Tex., Houston**—PARKS—City, Lewis Cutrer, mayor, voted bonds Jan. 25 parks and recreation facilities. **$2,500,000.** CD 1/7.

(Proposal Advertisement see pp. 274 to 276)

OFFICIAL PROPOSALS

APPEAR HERE EACH THURSDAY. PROPOSAL ADVERTISEMENTS ACCEPTED UP TO 10:30 A.M. FRIDAY FOR THE ISSUE DATED THE FOLLOWING THURSDAY.

Bids: June 1, 1958.

Advertisement No. 12
City of Baghdad
Baghdad Drainage—Machinery
Contract No. M.2
To Manufacturers of Centrifugal Pumping Plant

The Baghdad Sewerage Board invites Tenders for the manufacture, erection on site and commissioning of the following equipment:

53 ELECTRICALLY DRIVEN CENTRIFUGAL UNCHOKEABLE SEWAGE PUMPING UNITS in seventeen stations, complete with auxiliaries, control gear and wiring. The capacity of individual pumping units will depend on the location, but the smallest is 125 and the largest 15,000 Imperial gallons per minute.

The Tender Documents and Contract Drawings may be inspected during normal working hours after February 4, 1958 at the offices of the Baghdad Sewerage Board, Baghdad, at the Royal Iraqi Embassies in Bonn and Washington, at the Royal Iraqi Legations in Brussels and Rome, and also at the offices of the Consulting Engineers, John Taylor and Sons, Artillery House, Artillery Row, London, S.W. 1, and 464 Alwiyah, Baghdad. (Tel. 98736).

Copies of the Tender Documents and Contract Drawings may be obtained from any of the above-mentioned addresses on payment of I.D. 20 ($56.00). This payment will not be returnable and must be made by check or Banker's draft payable to the Consulting Engineers.

The Tenders shall be in English and must be accompanied by a deposit of I.D. 5,000 ($14,000) either in cash or by a letter of guarantee from an approved Bank in Iraq. The Tenders and accompanying documents must be enclosed in a sealed package which shall not in any way indicate the name of the Tenderer and must be delivered in Baghdad in accordance with the instructions contained in the Documents by 12 o'clock noon local time on the 1st day of June, 1958.

During the time allowed for tendering the Baghdad Sewerage Board reserves the right to amend the documents for the purposes of clarification or modifications in design or contract conditions. Any such amendments will be notified in writing to prospective tenderers.

The Baghdad Sewerage Board does not bind itself to accept the lowest or any Tender.

(Signed) FAKHRI AL FAKHRI
Chairman, Baghdad Sewerage Board

Bids: February 25th, 1958.

Contracts TN-10C and TN-10D

TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY

SEALED BIDS WILL BE RECEIVED BY Triborough Bridge and Tunnel Authority at its office, Administration Building, Randall's Island, Manhattan, New York 35, N. Y., as follows:

Until 11 A.M. on Tuesday, February 25, 1958

For Throgs Neck Bridge Contract No. TN-10C, Steel Superstructure—Bronx Approach, Borough of The Bronx in The City of New York. The bid must be accompanied by a deposit in the amount of $250,000.00.

and

For Throgs Neck Bridge Contract No. TN-10D, Steel Superstructure—Queens Approach, Borough of Queens in The City of New York. The bid must be accompanied by a deposit in the amount of $250,000.00.

Bidders may submit bid for either one or both of the above contracts.

Plans, specifications and contract documents may be purchased at the office of the Authority for $30.00, which will not be refunded.

Bids: March 10, 1958

Youth Center Building

Sealed proposals for Building, Mechanical, and Electrical Work for the Youth Center Building, Dearborn Civic Center, Dearborn, Michigan, will be received by the City of Dearborn, Michigan, at the office of the City Clerk in the Municipal Building, Michigan Avenue and Schaefer Road, until 2:00 P.M. March 10, 1958 and will immediately thereafter be publicly opened and read aloud.

One award will be made for building, mechanical, and electrical work.

The contract documents are on file and may be examined at the office of the Architects and Engineers during business hours. Copies of the documents may be obtained by depositing at the Architects and Engineer's office cash or check in the amount of $30.00, which amount will be refunded if the complete documents are returned in good condition within 10 days after the opening of bids.

Proposals must be submitted in the form provided therefor by the Architects and Engineers. A certified check or a cashier's check payable to the City of Dearborn, Michigan, in an amount not less than 5 percent of the base bid, shall be submitted with each proposal, subject to the conditions set forth in the Instructions to Bidders.

The accepted bidder will be required to execute performance and lien bonds, each for the full amount of the contract.

No proposal may be withdrawn for at least 60 days after the scheduled closing time for receipt of proposals.

The City of Dearborn reserves the right to waive any informality in any bid, or to reject any or all bids, in whole or in part, should it be deemed for its best interests so to do.

CITY OF DEARBORN, MICHIGAN
JOSEPH CARDINAL
City Clerk

Harley, Ellington & Day,
Architects and Engineers
153 E. Elizabeth St.
Detroit 1, Michigan

Bids: February 27, 1958

Contract O&M-462

THE PORT OF NEW YORK AUTHORITY
NEWARK AIRPORT
GENERAL LIGHTING IN PUBLIC PARKING AREA ADJACENT TO BUILDING NO. 1

Sealed proposals for furnishing all labor, material and equipment for installation of general lighting in the parking areas north and east of Building No. 1 at Newark Airport will be received at the office of the Department of Purchase and Administrative Services of The Port of New York Authority, Room 900, 111 Eighth Avenue, New York 11, New York, until 11:00 A.M., on Thursday, February 27, 1958, at which time and place said proposals will be opened and read.

Contract documents may be seen at the office of the Department of Purchase and Administrative Services, Room 900, and copies will be furnished upon deposit of $10.00 per set. Deposit must be delivered to Treasury Department, Room 1001, where a receipt will be issued. The receipt is then to be delivered to the Department of Purchase and Administrative Services, and you will be furnished with the contract documents. The deposit will be remitted if the documents are returned in good condition, not later than thirty days after the opening of proposals. The deposit will be forfeited if the documents are not returned within thirty days.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman

New York, February 13, 1958

Bids: February 20, 1958.

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, Canal Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time on the 20th day of February 1958, by Henry A. Cohen, Director, Bureau of Contracts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 2, LACY KETCHUM, District Engineer, 109 No. Genesee Street, Utica 1, New York						
Herkimer	RC 58-6	Herkimer-Middleville, S.H. 460, BR. No. 2	....	Cleaning & Painting Br.	$400 Plans $2	$7,100
Herkimer & Oneida	M 58-1	Movable Dams 13 & 14 Burdick's Bridge E60	....	Cleaning & Painting 2 Movable Dams and Br.	$650 Plans $10	12,600
DISTRICT No. 5, G. H. YOUNGMANN, District Engineer, State Office Bldg., 65 Court Street, Buffalo 2, New York						
Erie	PSC 17043	Bridges Carrying Seneca Street (C.R.) Over Pennsylvania R.R. & New York Central R.R.	0.22	Asphalt Concrete, 0.22 Mile, Including Reconstruction of 2 Brs., I Beam Br. Over Pennsylvania R.R., 3 Spans Total 86', I Beam Br. Over New York Central R.R., 3 Spans Total 88'	$6,000 Plans $2	115,000
Niagara	M 58-2	Pendleton Guard Gate No. 18	....	Cleaning & Painting Guard Gate	$500 Plans $10	9,400
DISTRICT No. 8, K. G. RAUER, District Engineer, Pleasant Valley Road, Poughkeepsie, New York						
Orange	FASS 58-2	Warwick-Smith Corners Road, Part 2, County Road No. 1, Project S-484(I)	.31	Asph. Conc.=0.27 Mile; Misc. Work=0.04 Mile; Prestressed Conc. Beam Br., 3 Spans Total 170.3 Feet	$24,000 Plans $2	428,000
Westchester	FISWC 58-1	New York State Thruway—Southern West. Connection—Sub. 11 (New York City Line-Tuckahoe Road) Project I-1100(4), Interstate Route 502	0.16	Grading, Drainage & Misc. Work 0.16 Mile, including Ped. Overpass—Weld. Girder 5 Spans Total—315.8 Feet; Ped. Overpass—Weld. Girder 2 Spans Total—199.5 Feet	$10,000 Plans $3	177,000
DISTRICT No. 9, J. C. FEDERICK, District Engineer, 71 Frederick Street, Binghamton, New York						
Sullivan	FESS 58-1	Barryville-Eldred, C.R. 11 Project ER-22(2)	0.82	Asph. Conc. 0.82 Mile Including Prestressed Concrete Beam Bridge Span 52.3'	$18,000 Plans $2	319,000
DISTRICT No. 10, M. E. GOUL, District Engineer, 325 W. Main Street, Babylon, L. I., New York						
Bronx	FICBE 58-1	Cross Bronx Expressway—Contract IF (University Ave. to Anthony Ave.), Interstate Route Connection No. 511. Project I-1084(31)	0.98	Demolition	$43,000 Plans $2	789,000
Suffolk	OPRC 58-1	Ocean Parkway NRH-OP 33-1	7.14	8" Cem. Conc. Pavt., 25' Wide	$150,000 Plans $3	2,501,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage) Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specification, and contract agreement, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Laws, as set forth in "Instructions to Bidders".

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
SUPT. OF PUBLIC WORKS

Bids: March 24, 1958

Construction and Marine Equipment

Located at
Port Newark, N. J.

1—WHIRLEY CRANE, WILEY MODEL 120, rated lift 45 tons @ 30', mounted on a Wiley Steel Barge 120' long, 45' wide, 8' deep. Barge is equipped with 4 fair leads, 2 - 3 drum steam deck winches, 1 steam operated air compressor, 4 spud wells, 2 - 9000 gal. fuel oil and 2 - 15,000 gal. water tanks.

1—KOEHRING MODEL 1205 CRAWLER CRANE with 100' boom, 30' jib, 50 ton double sheave hook block and third drum assembly - 42" cats.

2—WILEY DECK CARGO BARGES 120' long, 36' wide, 8' deep. All welded steel construction with decks reinforced to permit operation of 100 ton crane anywhere on deck. Each barge is equipped with 4-fair leads, fuel oil tank and two—2 drumwinches. One barge also has two deck winches and air reserve tank.

1—UTILITY PUSH AND TOW BOAT—"Bridgebuilder VI", 46' long, 14' wide, 4.7' deep powered by 2 G.M. 165 h.p. Diesel engines.

2—INGERSOLL-RAND MODEL DR 600 GYRO-FLOW AIR COMPRESSORS powered by G.M. 6 cylinder oil cooled Diesel engines and rated at 600 cfm at 100 lbs. Skid mounted.

1—KELLY GOULD 4 STAGE JET PUMP skid mounted with valves.

2—FRUEHAUF CARGO VAN TRAILERS plywood lined with windows and curbside doors.

Also included are pile driving hammers with bases, driving heads, pile leads and hammer carriages.

Most of the equipment was purchased new and used for less than one year. All is considered in excellent condition. To be sold as is and where is on an any or all basis. Bids are due on or before 3 P.M. E.S.T. Monday, March 24, 1958. For photographs and bid papers write or phone

The Port of New York Authority
Purchase & Administrative Services Dept.
111-8th Avenue
New York 11, N. Y.
Tel.: ALgonquin 5-1000, Ext. 206.

Bids: February 25, 1958

Contract GWB-802.257

THE PORT OF NEW YORK AUTHORITY
GEORGE WASHINGTON BRIDGE
LOWER LEVEL EXPANSION
NEW YORK APPROACH
BORINGS EAST OF HAVEN AVENUE

Sealed proposals for making borings and taking samples for additional approaches for the George Washington Bridge will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, New York, until 2:30 P.M. on Tuesday, February 25, 1958, at which time said proposals will be opened and read in Room 1108.

Contract Documents may be seen at the office of the Engineer of Design of the Authority, Room 1115, and copies will be furnished upon request. No deposit will be required but the documents shall be returned in good condition not later than forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman
New York, February 13, 1958

Bids: March 18, 1958

Structural Steel Bridge Bolted Construction—Erected in 1954

Three Spans totalling 332 Ft. 19 Ft. clear width throughout.

6" x 12" timber deck on 14" wide flange beams.

162 Ft. "Through Pratt Truss" center span with 16'-6" clearance above deck.

85 Ft. "Deck Warren Truss" side spans.

Located in Weehawken, New Jersey. To be sold "as is and where is". Bids are due on or before 3 P.M., Tuesday, March 18, 1958. For bid papers write or phone

The Port of New York Authority
Purchase & Administrative Services Dept.
111 - 8th Avenue
New York 11, N. Y.
ALgonquin 5-1000, Ext. 206.

U. S. Government

GOVERNMENT OF DISTRICT OF COLUMBIA, DEPT. SANITARY ENGINEERING, FEBRUARY 3, 1958. SEALED PROPOSALS will be received in Room 404, 499 Pennsylvania Avenue, N.W., Washington 1, D. C., until 2 PM, EST, March 17, 1958; and then publicly opened and read for construction of TRUNK WATER-MAINS, 72" LOW SERVICE—Dalecarlia Reservation, 48" First High—from Dalecarlia to MacArthur Boulevard and Elliot Place, N.W., consist. of 220 lin. ft. 72"; 13,700 lin. ft. 48"; and 60 lin. ft. 30" dia. watermain. Proposal forms, plans and specns. obtainable from Supervisor, Bid & Contract Section, Procurement Office, D. C., Rm. 404, 499 Pennsylvania Avenue, N.W., upon deposit of a certified check for $50.00 per set, payable to Collector of Taxes, D. C. (Tel. NA 8-6000, Ext. 2378).

Bids: February 24, 1958.

City of East Orange

Public Notice is hereby given that the Board of Water Commissioners in the City of East Orange, in the County of Essex, New Jersey, invites sealed proposals for furnishing housing, transformer installations and motor controls, miscellaneous electrical installations, electrical power transmission installations, telephone cable installations, meters and gauges, telemetering and pipe line installations, etc. for ten (10) new wells at various sites in the East Orange Water Reserve, and including miscellaneous work at three existing well houses and at the White Oak Ridge Pumping Station.

Bids will be received at the office of the Board of Water Commissioners in the City Hall, East Orange, New Jersey, on February 24, 1958 at 8:00 p.m. EST, at which time and place sealed bids will be publicly opened, and read aloud immediately thereafter. Bids must be delivered to above place no later than the hour named, and no bids will be received by mail.

The Instructions to Bidders, Form of Proposal, Form of Bonds, Statement of Bidder's Qualifications, and Plans and Specifications prepared by Angus D. Henderson, Consulting Engineer, 330 Winthrop Street, Westbury, New York are on file at the office of said Engineer and at the office of the Board of Water Commissioners. Bidders will be furnished a copy thereof by the Board of Commissioners at their office, City Hall, East Orange, New Jersey, or by the Engineer on proper notice and payment of $25.00 to him for each set furnished, which amount will be refunded to the bidders who submit bids, and return the Plans and Specifications in good condition within five days after bids are received.

Each separate bid must be enclosed in a sealed envelope endorsed with the name and address of the bidder, the name of the project for which the bid is made, and be addressed to the Board of Water Commissioners.

Each bid must be accompanied by a bid bond in the form set forth in the "Instructions to Bidders." Said bid bond shall be in an amount of not less than 10% of the bid and shall be written by a surety company licensed to do business in the State of New Jersey, and acceptable to the Board of Water Commissioners.

Applicable blank spaces in the bid must be filled in, and no changes shall be made in the phraseology of the bid. Bids that carry any omissions, erasures, alterations or additions may, at the option of the Board of Water Commissioners, be rejected.

The Board of Water Commissioners reserves the right to reject any and all bids or parts of bids, waive any and all defects and informalities therein and to award contracts for separate trades, as may be deemed best for its interest.

No bidder may withdraw his bid within 45 days after formal opening thereof.

By order of the
BOARD OF WATER COMMISSIONERS OF THE CITY OF EAST ORANGE IN THE COUNTY OF ESSEX, NEW JERSEY
Charles G. Bourgin, Secretary

Bids: February 27, 1958

Notice to Contractors

Separate sealed proposals for the
General Construction
Heating and Ventilating
Plumbing
Electrical
work for a primary addition to the Setauket School, Setauket, Suffolk County, New York, will be received by the Board of Education, Union Free School District No. 2 of the Town of Brookhaven, Suffolk County, Setauket, New York on Thursday, February 27th, 1958, until 2:00 P.M. at which time they will be opened and read aloud.

Plans and Specifications may be examined at the School in Setauket, at the office of Lorimer Rich and Associates, Architects, 35 West 53rd Street, New York, N. Y. and at Dodge Reports, 120 West 42nd Street, New York, N. Y. and copies of same may be obtained from the office of Lorimer Rich and Associates, 35 West 53rd Street, New York, N. Y. by deposit of $25.00 for General Construction plans and specifications and $15.00 for each mechanical trade. Such deposits will only be refunded to contractors who submit a formal proposal with the required bid security and who return the plans and specifications to Lorimer Rich and Associates, in good condition within 20 days after the opening of bids.

The Board of Education reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid, security in the amount of five per cent (5%) of the base bid in the form and subject to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

No bidder may withdraw his bid within 45 days after the date set for the opening thereof.

Dated: February 1st 1958
Board of Education
Union Free School District No. 2
Town of Brookhaven
Suffolk County, New York
By Alphonso E. Jesaitis
Clerk

Bids: February 27, 1958

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, and Article 2, Title 9 of the Public Authorities Law, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time, on the 27th day of February 1958, by Henry A. Cohen, Director, Bureau of Contracts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name
DISTRICT No. 1, L. G. Nickerson, District Engineer; 353 Broadway, Albany 1, New York		
Albany & Renss.	TABS 58-1	New York State Thruway—Berkshire Section, Subdivision B-1, Hudson River Bridge and approaches

Miles	Type	Deposit	Estimated Cost of Work
1.05	Reinforced Concrete Pavement of Bridge Deck	$60,000 Plans $5	$1,103,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage) Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specification, and contract agreement. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Laws, as set forth in "Instructions to Bidders".

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
SUPT. OF PUBLIC WORKS

READ THE OFFICIAL
PROPOSAL COLUMN OF
ENGINEERING NEWS-RECORD
THIS WEEK AND EVERY WEEK

Public Auditorium Authority of Pittsburgh and Allegheny County

1046 Union Trust Building
435 Fifth Avenue
Pittsburgh 19, Pennsylvania

Notice to Bidders

You are hereby informed that Bulletin (Addendum) No. 3, dated January 31, 1958 to the Specifications and Contract Plans for the Construction of the Auditorium for Public Auditorium Authority of Pittsburgh and Allegheny County, Pittsburgh 19, Pennsylvania, is available in the office of Mitchell and Ritchey, architects, 1019 Plaza Building, Pittsburgh 19, Pennsylvania. This addendum shall be incorporated with the original specifications and Contract Plans and the modifications, corrections, clarifications and the adjustments contained in Bulletin (Addendum) No. 3 shall take precedence over any and all information previously issued.

PUBLIC AUDITORIUM AUTHORITY OF PITTSBURGH AND ALLEGHENY COUNTY
NICHOLAS STABILE, SECRETARY

Bids: February 25, 1958

Contract GWB-190.211

THE PORT OF NEW YORK AUTHORITY
GEORGE WASHINGTON BRIDGE
LOWER LEVEL EXPANSION
NEW JERSEY APPROACH
DEMOLITION—2086 HUDSON STREET

Sealed proposals for the demolition of a frame house and two garages at 2086 Hudson Street, Fort Lee, New Jersey, will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, February 25, 1958, at which time said proposals will be opened and read in Room 1108.

Contract Documents may be seen at the office of the Engineer of Design of the Authority, Room 1115, and copies will be furnished upon request. No deposit will be required but the documents shall be returned in good condition not later than forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman
New York, February 13, 1958

OFFICIAL PROPOSALS

RATE: The rate for Official Proposal Advertising is $2.40 per line (or fraction) per insertion.

COPY RECEIVED: up to 10:30 A.M. Friday for issue out following Thursday subject to space open for last minute ads.

SEND COPY: to Official Proposal Division, Engineering News-Record, Class. Adv. Div., P. O. Box 12, New York 36, N. Y.

EMPLOYMENT OPPORTUNITIES

—RATES—

DISPLAYED

The advertising rate is $39.20 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

NATIONAL
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$2.40 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads take ½ of above rate.

Box Numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW Ads and Inquiries to Classified Advertising Division of ENGINEERING NEWS-RECORD
P. O. Box 12, N. Y. 36, N. Y. February 27th issue closes February 17th

WANTED

SANITARY ENGINEER

With ten years experience. College graduate. Qualified for registration. Experienced in water and sewage plant design. Salary in five figures for the right man.

Floyd Browne and Associates
125 West Church Street Marion, Ohio

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Assist. Prof.—To teach undergrad. courses in surveying and highway engineering. Salary depends on qualifications. Dept. of Civil Eng., Univ. of N. Dakota, Grand Forks, N. Dak.

Detailer & Checker Structural Steel. Must be experienced. Hospitalization and retirement benefits. Give references, age, and salary expected in application. Barber & Ross Company, 2323-4th Street, N.E., Washington, D. C.

Sales Manager and sales force wanted for large prestressed concrete manufacturing firm in Florida. Engineering background desired. Contact P-7073, Engineering News-Record giving full background information and desired salary, etc.

Hydraulic Engineers—Civil Engineer Graduates—All grades, interested or experienced in Stream Flow Measurements, analysis of Hydrologic data, Hydraulic design criteria for dams, channels and bridges for regulatory agency. Duties include review of plans and specifications, report writing, operation of stream-gaging network, interpretation of stream flow data, field investigations and inspections, with some travel and public relations. Salary depending on experience, Location Harrisburg, Pennsylvania. P-6828, Engineering News-Record.

Experienced Sewer, Grading and Paving Foremen—Steady Employment to qualified Men—Northeastern Ohio. Please reply, giving qualifications and experience, to P-7121, Engineering News-Record.

Designer-draftsman, preferably in 30's with mechanical and electrical experience, capable of making plumbing and electrical layouts for one-family and row house developments in Florida, Caribbean and Middle East. Ability to write outline specifications desirable. Occasional travel involved. Salary $150-$175 per week. Retirement benefits, life insurance and medical care included. P-6977, Engineering News-Record.

Graduate Civil Engineer or Architect for permanent position with long-established national organization. Technical and promotional work: cover Pennsylvania. Car furnished. Summary should include experience, education, salary requirement, etc. P-7194, Engineering News-Record.

POSITIONS VACANT

Estimator—Cost Engineer—experienced in highway, structures desirable. Permanent position with medium sized growing Ohio General Contractor. P-7267, Engineering News-Record.

General Superintendent—Young, fast growing Westchester General Contractor has once in a lifetime opportunity. If you're 30 to 45, can handle subs, push supers, bring jobs in on schedule and are cost conscious: if you've done public works, commercial and industrial buildings, you are our man. Permanent. Salary plus. P-7245, Engineering News-Record.

Help Wanted: Ontario County. Assistant Engineer. $4900.00. Also, Engineering Aide, $3600.00. These exams. open to eligibles nationwide. Exams. March 22, 1958. Last date for filing applications Feb. 28, 1958. Applications and further information available at office of Civil Service Commission, Court House, Canandaigua, New York.

Engineer or architect experience in field supervision. Commercial, industrial or mass housing. Experience in contract supervision and purchasing, also administrative details. Younger man preferred desirous of associating with growing organization offering possible future participation. Experience, salary, references. P-7236, Engineering News-Record.

Designers, Bridge and Highway—3 years experience in Consultant's Office. Send resume P.O. Box 752, Providence, R. I.

The City of Coatesville, Pennsylvania, desires the services of an engineer to assist the City Engineer. The position will lead, possible in 1959, to City Engineer. If interested, please address Director Louis Apfelbaum, Esq., Department of Streets and Public Improvements, National Bank of Chester Valley Building, Coatesville, Pennsylvania.

Engineer to expand applications, acceptance and specifications by engineering firms of our established corrosion—and waterproofing products. Construction background necessary: mechanical or chemical engineering desirable. Considerable travel USA. Age 30-45. P-7281, Engineering News-Record.

Construction Man Wanted. Sixty year old well-known construction and engineering corporation operating in central New York desires to locate a thoroughly qualified all-around construction man who is able to prove himself and is qualified to become a fourth partner within one year. No capital is necessary but must be immediately responsible and good at supervision, subcontracts, estimating, expediting, cost-keeping, record-keeping, etc. Initial position will be to take over most of such detail work now being handled by President. Must be around 35 years old and a graduate civil engineer. P-7289, Engineering News-Record.

Wanted: Assistant Project Irrigation Manager for 60,000 acre project, capable of taking over management in six months to a year. Qualifications: Graduate C.E. Engineer or experience equivalent; experience in construction, design, operation and maintenance or irrigation works, hydraulic and electric pumping plants, heavy maintenance equipment and familiar with Irrigation District and Bureau of Reclamation policies. For application forms and further information contact the Board of Control, Lower Yellowstone Irrigation Project, 124 West Main, Sidney, Montana.

POSITIONS VACANT

Engineer. Graduate, civil and structural, experienced. Design complex steel structures, reinforced and prestressed concrete. Permanent. Midwest location. Will pay moving expenses. Salary open. P-7240, Engineering News-Record.

General Manager, Construction Company, to 34. Grad. Engr., Preferable Civil, with outstanding management ability to Bldg. Construction experience. 50 year old N.Y.C. Bldg. Contractor with recent Volume of $1,000,000 per year. Must be available for interview in N.Y.C. P-7290, Engineering News-Record.

POSITIONS WANTED

Superintendent or Estimator thoroughly experienced and qualified to handle all phases of job from bid to completion: Sewage and Water Treatment Plants, Power Plants, Building Const., Bridges, Foundations, Cofferdams, Piling, Reinforced Concrete. PW-7010, Engineering News-Record.

Canadian Consulting Engineer, civil, seeks short term foreign jobs. Salary or fee basis. PW-7025, Engineering News-Record.

Electrical Engineer. Thirty-five years experience all phases of electrical and mechanical construction and operation. Married, no children, free to travel. Excellent health. Layout and design. Prefer field and construction. PW-7127, Engineering News-Record.

Purchasing—Broad experience heavy construction and general contracting procurement. Excellent administrative experience with competitive bidding and sub-contractors. Relocate own expense. PW-7138, Engineering News-Record.

Construction Executive, 30 years experience in all phases of industrial and heavy construction. Power plants, chemical plants, refineries, mechanical installations and piping, buildings, locks, dams, foundations, and tunnels. Interested in connection with aggressive company doing competitive contracting and promotional sales work. Contract negotiations, estimating and pricing accurate. Personal industrial contacts. Top labor relations with all crafts. Primary education M.E. Reply PW-7158, Engineering News-Record.

Soils and materials engineer, 39, single, highly qualified, over eight years office & field experience. M.S. (Soil Mech.) & M.S. (Highwy. Engg.), special experience in soils and foundations. Regd. P.E. Present emoluments about $10,000 annual. Available April, any location. PW-7217, Engineering News-Record.

Wanted by Construction Supt. work. All types of work, roads, bridges etc. In Southern New England. Available now. PW-7165, Engineering News-Record.

Contractor's assistant, competent estimator-job manager, graduate engineer, 32, seeks position of responsibility with medium size building contractor. Prefer Southeast or Middle Atlantic states. PW-7201, Engineering News-Record.

Mechanical Engineer, 38 years old, 17 years experience, to act as Resident for Canada with H.W. in Montreal. Maintenance, Construction, Heavy Machinery, Power House, Industrial and Airport Equipment. Presently employed as Chief Mechanical Engineer and well connected throughout the country. Fluently bilingual. Minimum salary $12,000. PW-7208, Engineering News-Record.

(Continued on page 279)

The Commonwealth of Pennsylvania Invites

HIGHWAY & BRIDGE DESIGN ENGINEERS

to join our distinguished staff. Many vacancies exist throughout the Commonwealth. Salaries range from $5500 to more than $12,000 based upon education and experience. Security assured through Civil Service. Send complete resume prior to Feb. 20 to:

PERSONNEL PA. HWYS. DPT., HARRISBURG, PA.

ENGINEERS DESIGNERS

McKee has permanent openings at their Cleveland, Ohio, offices for men with at least 3 years' experience in any of the following:

Oil Refineries
Blast Furnaces
Steel Mills
Industrial Plants

In the following categories:

Piping Checkers
Process Piping
Piping Layout
Concrete
Structural
Electrical
Mechanical
Pressure Vessel
Mechanical Equipment
Specifications
Instrumentation
Estimators

Broad diversification of work in our 3 engineering divisions assures you security of employment.

Send detailed resume to
G. VICTOR HOPKINS

ARTHUR G. McKEE & Co.
2300 Chester Ave., Cleveland 1, Ohio

WANTED

A SALES MANAGER FOR BANG-UP JOB

We have a challenging opportunity for an unusual man in his thirties with a degree in Chemistry or related field; a man who can sell and who also has some missile or rocket development know-how. The project—to set up a sales organization, obtain new business and set the stage for future development in the field of explosive and pyrotechnic devices related to the rocket and missile industry and to negotiate research and development type contracts. Will require the writing of detailed proposals. Extensive travel from New England base. Please send comprehensive resume.

P-7239, Engineering News-Record
Class. Adv. Div.,
P O. Box 12, N. Y. 36, N. Y.

DEPUTY RESIDENT ENGINEER

For a $40 million rockfill and concrete dam in Iraq. Two-year contract; approximately 3-year completion schedule. Family housing at site, but no local educational facilities for children. Fill type dam construction experience required—preferably rockfill. Must be fully capable of assuming duties of Resident Engineer as required. Position is available immediately. Excellent salary. Please send complete personal and experience record to Hugo O. Niemi, Personnel Manager.

HARZA ENGINEERING COMPANY
400 W. Madison St., Chicago 6

ENGINEERS

Designers Detailers Draftsmen

for work on

BRIDGES AND EXPRESSWAYS

PERMANENT POSITION DEPENDING ON EXPERIENCE AND ABILITY

PAID VACATION, SICK LEAVE HOSPITALIZATION, LIFE INSURANCE

OPENINGS IN:
KANSAS CITY, MO. CLEVELAND, OHIO
MILWAUKEE, WISC. ORLANDO, FLORIDA

INCLUDE EDUCATION, EXPERIENCE, REFERENCES AND SALARY EXPECTED IN APPLICATION LETTER TO

Howard, Needles, Tammen & Bergendoff
1805 GRAND AVE. KANSAS CITY 8, MO.

PROJECT ENGINEER

A nationally known tin can manufacturer has an excellent position available for a graduate Mechanical or Industrial Engineer as a Project Engineer in its Container Division, located in the Midwest.

Applicant should have approximately five years of experience in the designing, repairing, installing and trouble-shooting of all types of tin can manufacturing equipment. Should also be familiar with the design and construction of standard lines of tin cans as well as the latest types of metal containers such as aerosol cans, etc.

This is a position of promotional opportunity. Excellent fringe benefit program. Please state age, formal education, experience, salary desired and other information. All replies confidential.

P-7178, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

SUPERINTENDENT

General Contractor will add to expanding organization man qualified for large projects run independently of main office. Should be thoroughly experienced in both field supervision and estimating to handle smaller jobs, as is sometimes necessary, with minimum of field help. Man wanted is not the "Project Manager" type, but one not afraid of the hard work required to meet costs on lump sum contracts. Well paid and continuous employment. Work generally in Eastern half of this country. Give full resume in reply, particularly records of cost and schedule compliance.

Blount Brothers Construction Company
P. O. Box 949 Montgomery, Alabama

SALES REPRESENTATIVES OPENINGS

Well known midwest manufacturer of contracting and mining equipment has several attractive openings for sales representatives for established territories in Canada, New York, Pennsylvania, Arizona and midwest. Good starting position, with excellent opportunity for advancement. Should be familiar with selling through dealer organizations.

SW-7093—Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

BRIDGE MAINTENANCE SUPERINTENDENT

Licensed structural engineer, 35—50, to take complete charge of maintenance operations on major bridge in California. Must have broad background in steel bridge maintenance and repair, and supervising men. Railroad bridge field inspection and supervision helpful. Salary commensurate with education, experience and responsibilities involved. U. S. citizenship required. An outstanding opportunity with permanency, liberal insurance, retirement and other benefits. Interview at mutually convenient location will be determined on basis of personal history furnished. Send complete resume to Box 99, Presidio Station, San Francisco, California.

WANTED

CIVIL and SANITARY ENGINEERS

Qualified by training and experience to serve as resident engineers on water and sewerage construction. Must be registered, or qualified for registration. Also qualified inspectors for Ohio municipal projects.

FLOYD BROWNE and ASSOCIATES
125 West Church Street Marion, Ohio

ASSISTANT SUPERINTENDENTS OR FOREMEN

Two or three assistant superintendents or foremen required for company in midwest. Must have engineering background capable of maintaining precise construction records and handle group of thirty men. Mostly transmission line work. Must be good pushers for work in field and have good construction and engineering background. Top opportunity with large company. Permanent salary to $10,000 for right party. Reply with full details to:

P-7248, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

CONSTRUCTION EXECUTIVE

to represent American contractor in Spanish speaking countries. Must be of Spanish—South American origin, with a wide background of experience in heavy construction work. Write giving complete experience record and qualifications.

Personnel Director
Perini Corp.
Framingham, Mass.

POSITIONS WANTED

(Continued from page 277)

Dredging Engineer. All phases for port, harbor, channel and river work. Layout, design, supervision, operation, hydro and land surveys, inspection. Individual services or with supporting personnel. Will contract for work anywhere in world. John Huston, Corpus Christi, Texas. TUlip 3-1201, TErminal 5-0742.

Supt. or General Foreman—Age 42—over 20 years heavy construction experience. Excavation, grading, drainage. Know men, methods, equipment and cost. Available after March 1st. A-1 references. PW-7221, Engineering News-Record.

Young executive C.E. 10 years experience marine and heavy construction pile driving, breakwater construction, dredging, bridges substructures desires position with opportunity for advancement. Resume on request. PW-7228, Engineering News-Record.

Project Manager—seeking position leading to top management or participation in ownership. Age 32, married, Grad. C.E., Lic. Prof. Engr. NYS, 8 yrs intensified experience in Gen. Constr., Through knowledge bid to completion, used to heavy responsibility and have fine record of successfully completed projects, currently employed. PW-7220, Engineering News-Record.

Construction Executive, 40, twenty years experience all phases construction. Heavy, Industrial, Commercial, Public, Bridges. Case Tech Graduate in Civil and Structural, registered in Ohio. Good at job supervision, Purchasing, and Professional Estimator. This man is a money maker. PW-7222, Engineering News-Record.

Construction Supt., Industrial, Commercial building. Now employed. Also well experienced in Field Engineering on Heavy and Building Construction. PW-7227, Engineering News-Record.

Construction Manager, graduate civil engineer, age 51, qualified for supervision all phases of heavy construction; currently completing multi-million dollar Government project, Pacific Northwest. Available April 1st, location immaterial, resume on request. PW-7224, Engineering News-Record.

Consulting Civil-Hydraulic-Irrigation — and Drainage Engineer available for foreign assignments varying from one month to six months duration. Professional Record-Rates of Pay and References Furnished to Interested Clients. PW-7241, Engineering News-Record.

Construction Engineer, age 32, graduate, duties last seven years with small building contractor have included estimating, managing, supervising. Seek east or south location. Except salary of $8700. PW-7234, Engineering News-Record.

Field office engineer, broad experience highways, location, design, waterfronts. Fluent Spanish. Write specs. contracts. Anywhere. PW-7246, Engineering News-Record.

Project Manager or Superintendent for architect or contractor 30 years experience industrial, commercial, chemical, plant; airfield air base and missile base also highway and sewer construction. Available immediately. Stateside or overseas. PW-7274, Engineering News-Record.

Superintendent — Highway construction, grading, bridges and pavement. Complete charge of projects. Reply PW-7269, Engineering News-Record.

Architectural civil spec. writer inspector, graduate engineer, ten years experience. PW-7272, Engineering News-Record.

Elec. Constr. Supt. Immed. Available. Const. or Main., Foreign Pref. Exp. Po. Pl., Distrb. & Gen. Industrial, PW-7280, Engineering News-Record.

AVAILABLE PRESTRESSING EXEC.-ENGINEER

Plant manager in full charge of production, scheduling, estimating, bidding, contract negotiations, erection. Complete design and construction of beds, tensioning eqpt., materials handling, batching, heating and all associated equipment. Design and development of products and production methods.

BSCE, MSCE. Licensed, experienced in sales and sales promotion, product development, bridge design and construction.

PW-7229—Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS WANTED

Civil Engineer, 33, European educational background, German degree, 8 years exp. U. S. & Europe, Bridge & Highway construction, management supervisor design. Desires permanent position with stable progressive firm only; domestic or foreign. PW-7287, Engineering News-Record.

Construction Manager: 15 years sound experience, Exec. Ability, Engineering and Field Supervision, Estimating, Expediting. Industrial and Power Plant Building Construction and Mechanical Installations from customer contact to completion of projects. Desire permanent connection with Engineering and Construction Firm or expanding Utility. PW-7263, Engineering News-Record.

Senior Structural Engineer, Estimator, Spec. Writer. Thorough supervisory experience leading engineering & const. firms. Power plants, large industrials, waterfront structures, dams, airfields, bridges, etc. Permanent position wanted. M. Atl. or N.E. PW-7278, Engineering News-Record.

Materials Engineer over 20 years experience in Soils Mechanics, Asphalt, Concrete on domestic & foreign projects with contractors, engineers & governments. Specialized in lab and field control supervision. PW-7288, Engineering News-Record.

SELLING OPPORTUNITY WANTED

Sales Engineer; graduate; age 27; experienced selling pre-fabricated buildings seeks position similar field; South preferred. RA-7270, Engineering News-Record.

WORK WANTED

Surveying field parties experienced, fully equipped. Contract or per diem, licensed. WW-7196, Engineering News-Record.

Structural Design and preparation of drawings for refineries, industrial and public buildings. Prompt and experienced service. WW-7265, Engineering News-Record.

PART-TIME WORK WANTED

Part Time Work—Retired licensed structural engineer available for structural design, shop drawings, reinforced concrete. PTWW-7193, Engineering News-Record.

Engineer-Licensed P.E. & L. Surveyor desires part time work in N.Y.C. area. Structural Design etc., Estimating or Surveying. Reasonable. PTWW-7275, Engineering News-Record.

SEARCHLIGHT SECTION

(Classified Advertising)

BUSINESS OPPORTUNITIES — **EQUIPMENT USED or RESALE**

—RATES—

DISPLAYED

The advertising rate is $25.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

UNDISPLAYED

$2.40 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

Send NEW ADVERTISEMENTS or Inquiries to Class. Adv. Div. of Engineering News-Record, P. O. Box 12, N. Y. 36, N. Y. February 27th issue closes February 17th

STRUCTURAL ENGINEERING
ARCHITECTURAL ENGINEERING
OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations. Forty third year
Write today without obligation
WILSON *Engineering Corp.*
College House Offices HARVARD SQ., CAMBRIDGE, MASS.

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

CONTRACT WORK WANTED

Design, specifications, contract drawings, for all types of simple, continuous, and long span bridges. Tight time schedules met. Professional Engineers. Bridgeway Associates, 127 Liberty St., N.Y.C.

BUSINESS OPPORTUNITY

Construction Office Manager—estimator with much experience and some capital desires position and working interest in a general or specialty contracting, lumber, or building material business. Also interested in forming a partnership with capable building superintendents with capital, to perform public, commercial and industrial work above the $100,000.00 class. References and full information exchanged. BO-7279, Engineering News-Record.

FOR RENT

For rent approximately 7000 square feet in new building, Long Island City, windows on four sides, air conditioning and private elevator available, reply FR-7277, Engineering News-Record.

WANTED

Anything within reason that is wanted in the field served by Engineering News-Record can be quickly located through bringing it to the attention of thousands of men wrose interest is assured because this is the business paper they read.

NEW PRODUCTS WANTED

Well-known midwest construction equipment manufacturer with complete production and merchandising facilities will pay well in cash or royalties for new construction products. Write:

BO-7144, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

BUSINESS OPPORTUNITY

For young civil engineer with $50,000.00 to buy half interest in 30 year old, well established heavy construction company operating in area within 100 miles of New York City. Organizer wishes to retire on account of age.

Write for interview giving in detail your educational and construction experience.

BO-7243, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ELECTRONIC COMPUTATIONS

Bendix G-15 computer available on service bureau basis for engineering computations.

- Earth work, traverses, highway geometrics
- Stress analysis, bridge design
- Hydraulics
- Traffic analysis

Programming available for other applications. For full information write to:

H. W. LOCHNER INC.
COMPUTER DIV.
20 N. Wacker Drive Chicago 6, Illinois
FRanklin 2-7346

COMPRESSORS: Electric, 440 volt. One Chicago Pneumatic, 75 H.P., 300 CFM. 2—Schramm, 100 H.P., 420 CFM. All complete with controls, etc.

SHOVELS: Electric. 2—Bucyrus Erie 54-B. Bargain price on each.

CLASSIFIERS: 2—Akins and 2—Wemco, 78" spiral duplex. Tank width 14 ft., length 36'6"; Condition like new.

DRYERS: 2—Ruggles Cole, Class XA18, double shell, size 104" x 65 ft. One Class XH12, single shell, 80" x 103". All complete with all auxiliary equipment. Condition like new. 2—Louisville 6' x 50, steam dryers. One used as a cooler. Condition excellent. 7'6" x 40 ft. Kiln suitable for use as reactor, cooler or dryer. 1—4½ x 40 ft. Kiln complete. 1—8 ft. x 125 ft. Kiln.

ROD MILL: 7' x 12' open end Marcy. **BALL MILL:** 7' x 12' open end Marcy. New 1954. Condition 95% new. All complete with motors, drives, etc.

LOCOMOTIVE CRANES: Std. R.R. gauge. 2—Industrial Brownhoists, 25 ton cap., 50 ft. booms, with clamshell buckets.

LOCOMOTIVES: Diesel electric. One Davenport 50 ton. One General Electric 80 ton.

MINE HOISTS: One 7' x 7' single drum, 400 H.P., 1⅛" rope. One 10' dia., 7' face, single drum with center dividing flange, 400 H.P., 1¼" rope. One 5' dia., 5' face, single drum, with center dividing flange, 100 H.P., 1" rope. One 84" dia., 54" face, double drum, 1⅜" rope, 400 H.P. One 10' dia., 10' face, double clutched drums, 1250 H.P., 1⅜" rope. All the above hoists have post brakes, Lilly control, 2200 volts and all are complete.

JAW CRUSHERS: 10 x 15, 10 x 20, 12 x 24, 15 x 36, 24 x 36, 25 x 40, 30 x 42, and 40 x 42. One 18 x 30" and one 24" x 72" sectionalized for underground use.

We Buy and Sell Equipment Throughout North and Central America

A. J. O'NEILL
Lansdowne Theatre Building
Lansdowne, Pa.
Phila. Phones: MAdison 3-8300—3-8301

EQUIPMENT
FOR SALE

- 5150 Bucyrus Monighan Drag, 165', 9 yd.
- 7400 Marion Drag, 160', 13 yd.
- 625 Page Diesel Drag, 150', 10 yd.
- 621-S Page Diesel Drag, 135', 6 yd.
- 2400 Lima Dragline, 130', 5 yd.
- 4500 Manitowoc Drag, 120', 5 yd.
- 111-M Marion Drag, 100', 4 yd.
- 1055 P&H Dragline, 100', 3½ yd.
- K-595 Link Belt Drag, 85', 3 yd.
- 54-B Bucyrus Erie Drag, 80', 2½ yd.
- 40-A Marion Dragline, 90', 2½ yd.
- 903 Osgood Dragline, 70', 2 yd.
- 170-B Bucyrus Erie 6½ yd. Elec. Shovel
- 120-B Bucyrus Erie 4 yd. Elec. Shovel
- 88-B Bucyrus Erie 4 yd. Standard Shovel
- 1055 P&H 3½ yd. Standard Shovel
- 80-D Northwest 2½ yd. Standard Shovel
- 51-B Bucyrus Erie 2 yd. Standard Shovel
- 38-B Bucyrus Erie Comb. Shovel-Crane
- #6 Northwest 1½ yard Shovel
- Unit 1020 ¾ yard Shovel
- Also, various smaller Shovels & Drags
- Truck Cranes—P&H, Link Belt, Bay City
- 400 Reich Truck Mounted Rotary Air Drill
- 600 Reich Heavy Truck Mounted Rotary Air Drill
- Euclid Trucks—Rear & Bottom Dump
- Shovel, Drag, Crane & Backhoe Attach. Drag & Dipper Buckets for most makes & models

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

STEEL BARGES and WILEY WHIRLEY FLOATING CRANES

Capacity to 100 tons
Continuous Production
Prompt Delivery

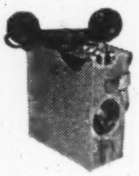
Crane Shown 40 Tons, 40 Ft. Radius
With 20' Turntable, 100 Ft. Boom

HAVRE DE GRACE SHIPYARD INC.
Havre De Grace, Maryland

FOR SALE

- 1—Single Drum Hoist Ottumwa 150 H.P.—2300 volt—60 cycle—3 phase
- 1—55' Headframe for 2 comp. shaft.
- 3—21—Eimco Tunnel Muckers—24" gauge
- 20—2½ cy. Watt Muck cars, side dump 24" gauge with "Can't-Miss" Couplers
- 5500'—of 18" Naylor Fanline with Couplings
- 1—Jeffrey Pan Feeder
- 4—Canton Car transfers, for 24" gauge track

FRAZIER-DAVIS CONST. CO.
1319 Macklind Ave. St. Louis 10, Mo.
Ph. ST. 1-1950



U. S. Army Telephones EE-8 fully reconditioned. Suitable for intercommunication between 2 or more points. $35.00 for 2 telephones, including 100 ft. of wire and batteries. Addtional wire 1¢ per ft. or $25.00 per mile. Write for free list on telephones. ALL shipments F.O.B. Simpson, Pa.

TELEPHONE ENGINEERING CO.
DEPT. ENR 38 SIMPSON, PA.

GUARANTEED EQUIPMENT FOR SALE

		Sale Price
1956	Gradall—All Attachments	$18,500.00
1956	Lorain "425W" Truck Crane—Extension Boom & Gantry	28,500.00
1957	Adams "660" Grader—Cab.	16,250.00
1954	Hough Loader—Rebuilt	7,500.00
1954-5	(2) Barco Tampers	400.00 each
1957	7500 L/F 9" Road Forms	1.70 L/F
1957	4000 L/F 10" Road Forms	1.90 L/F

TERMS OR LEASE—PURCHASE DEAL

FS-6869, Engineering News-Record
Class. Adv. Div., P. O. Box 12, N. Y. 36, N. Y.

FOR SALE

8" DREDGE

18' x 35' hull, Georgia pump, G. M. 6-71 and G. M. 2-71, 500' of pipe, excellent condition.

COAST DREDGING CORP.
Box 22 ***Phone AXtel 6-2479*** **Tuckerton, N. J.**

FOR RENT

3900 MANITOWOC LIFTCRANE

Only 9 months old—in excellent condition—70 ton capacity—160 foot boom—30 foot jib—torque convertor and manual control—located in western Pennsylvania—will move anywhere on long term lease.

STANDARD STEEL SERVICE, INC.
P. O. Box 929, Johnstown, Pa.
Phone 37-8451 or 37-7901

WANTED IMMEDIATELY

Model 33W Ingersoll-Rand Woodborers
Two 10-20 ton Gantry Cranes with travelers and 70'-100' boom. 220/440 AC current.

WE BUY, SELL OR RENT

Hoists — Buckets — Compressors — Air Tools — Mucking Machines—Tunnel Equipment
Blocks (up to 20 tons)—Chain Hoists—Blowers
Derricks—Steam & Air Hammers—Extractors
Winches—Hydraulic Jacks—Concrete Mixers
Air Locks & Shafting—Dump & Flat Cars
Chain Saws—Pumps of all Description
Steam Crane for Pile Driving—Pumpcrete Machines

MAHONEY-CLARKE, INC.
217 Pearl St. New York 38, N. Y.

FOR SALE:

3 REAR DUMP EUCLIDS

Models 2FD, 5FD and 27FD, all for $10,000.00.

CODELL CONSTRUCTION COMPANY
Winchester, Kentucky
Mr. J. E. Hunter, Phone 36

WANTED TO BUY

Vulcan No. 1 or McKiernan-Terry S-5 Pile Hammer

KELLY PILE DRIVING COMPANY
147-05 Douglas Ave., Jamaica 33, New York
Phone REpublic 9-5620

WANTED TO RENTAL PURCHASE

USED 4-5000# ASPHALT MIX PLANT

MUST BE IN EXCELLENT CONDITION

W-7086, Engineering News-Record
Class. Adv. Div., P. O. Box 12, N. Y. 36, N. Y.

FOR SALE or RENT

40 ton American Diesel Loco. Crane
65 ton Whitcomb Diesel Elec. Loco.
44 ton Whitcomb Diesel Elec. Loco.
25 ton Davenport Gas-Elec. Loco.
50 ton American Guy Derrick. 115′ Mast, 100′ Boom
90 HP Lidgerwood 2d Diesel Hoist w/Swinger
150 HP Amer. #140 3d Gas Hoist & Swinger
1½ yd. Lima 602 Crane. 110′ Boom General Motors Diesel Engine
60 ton Manitowoc 3900 Erection Crane, 140′ Boom.
110 HP Clayton Port. Steam Generator

WHISLER EQUIPMENT CO.

1905 Railway Exchange Bldg., St. Louis 1, Mo.
CHestnut 1-4474

FOR SALE

1—1201 LIMA HI LIFT Shovel, 1951, with Cummins Diesel.

1—3500 MANITOWOC Steel Erection Crane, Cummins Diesel, 100′ boom, 20′ jib., independent boom hoist.

CHARLES V. FISH CO., INC.
530 Hamilton Street
Allentown, Penna.
Telephone: HEmlock 5-4701

EQUIPMENT FOR SALE COMPLETELY REBUILT

		Sale Price
1954	Lorain KS 50 Crane—Backhoe—Drag.—Wide Cats	$19,500.00
1954	International TD24—Cab—	13,750.00
1956	Koehring 34E Dual Drum Paver—All Attachments — Rebuilt — Dec. 1957	26,750.00
1956	Adams "660" Grader—Cab—Bulldozer Blade	13,500.00
1956	Blaw Knox—10′-15′ or 20′-25′ Concrete Spreader	7,200.00
1956	Pan Vibrator Attachment For Above Machine	1,750.00
1954	Galion 3 Wheel—10 Ton Roller—Cab	5,350.00

FS-6865, Engineering News-Record
Class. Adv. Div., P. O. Box 12, N. Y. 36, N. Y.

FOR SALE

48B Bucyrus Erie Shovel diesel 2 cy
10,000′ 9″ x 9″ road forms
1,550′ 6″ x 6″ road forms*
2,500′ 16″ x 12″ airport forms*
*Used four months only

WILLIAMS CONSTRUCTION COMPANY
Box 5045 Balto. 20, Md. Murdock 6-6600

FOR SALE *(Reasonable)*

3—CAT D-8 Cable-Dozers

— MUST SELL —

THE EARLE EQUIPMENT CO.
6341 Tireman Ave., Detroit 4, Mich.

FOR SALE

One model 11B3 McKiernan Terry double acting PILE HAMMER

PHILLIP A. RYAN
118 W. Cabrillo Blvd Santa Barbara, California
WO 58903

Watch—
the *Searchlight Section*
for
Equipment Opportunities

GMC 6x6 NAMED ARMY'S BEST ALL-AROUND TRUCK!

- **Extra Pull Power!**
- **Double Traction for Mud!**
- **Special "Off Road" Design!**

UNUSED!

GUARANTEED! NEW-TRUCK PERFORMANCE!

From Government Storage — these all-wheel-drive GMC 2½ ton 6x6's were specially designed by the U. S. Army to take the roughest terrain in all kinds of weather. These unused 6x6's can do the same job for you in all your truck jobs; whether in a muddy field or along a super highway. Processed—by Memphis Equipment Company—down to the last bolt to assure you of receiving the finest unused GMC 2½ ton 6x6 trucks available today. Parts available anywhere in the nation.

For specifications, prices, delivery—write, wire or phone collect—JAckson 5-7841

MILTON Y. TOOMBS, JR. Sales Manager

MEMPHIS EQUIPMENT Company

ARMY TRUCKS • PARTS
CONSTRUCTION EQUIPMENT
766 SO. THIRD STREET • MEMPHIS, TENNESSEE

USED EUCLIDS

For Sale or Rent

Five Model 63TD, 22 Ton Rear Dumps, two with standard bodies, three with heated quarry bodies. All equipped with GM Diesel 300 H. P. engines and Allison Torqmatic 3 speed transmission. Year 1957. Aproximately 3 months use.

THREE Model 91FD, 18 Ton Rear Dumps. GM Diesel 218 H. P. engines. Year 1957. Used 4 months.

ONE Model 14TDT-21SH, 15½ cu. yd. 4 wheel Tractor Drawn Scraper. Cummins 275 H. P. engine. Year 1953. Good condition.

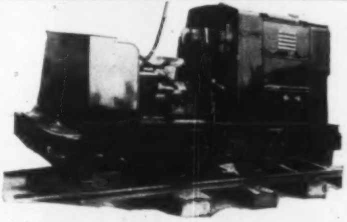
ONE Model 23TDT-21SH, 15½ cu. yd. 4 wheel Tractor Drawn Scraper. GM 300 H. P. Diesel engine, Allison Torqmatic 3 speed transmission. Year 1955. Good condition.

TWO Model 70FDT-89W 13 cu. yd. Bottom Dumps, Cummins 200 H. P. Diesel engines. New 1951. Reconditioned.

All offered subject to prior sale or disposition.

L. B. SMITH, INC.

357 W. Fayette St., Syracuse, N. Y.
Phone: GRanite 5-2196



2 DIESEL LOCOMOTIVES

2½ ton, 24" ga., English-made war surplus. Reconditioned like new with 16/20 H. P. Ruston engines. Three speeds each way. May be inspected at our plant. $3,000 each. F. O. B. our plant.

BRANDYWINE VALLEY
FABRICATORS, INC.
Box 1413, Lancaster, Pa.

FOR SALE OR RENT

CRANES

1—Model 820 Lorain—diesel—combination crane and dragline 2 yd. shovel front. Excellent condition.

1—Lima Model 550, 1¼ yd. capacity. Cummins diesel engine 90′ boom. Independent boom and travel.

1—Koehring Model 304 combination ¾ yd. crane, dragline and backhoe. 50′ boom. Gas. power.

GENERATOR

1—Littleford Steam Generator. 135 HP. Excellent condition, ready to go.

TRENCHER

1—Buckeye wheel-type trencher, Model 12. Gas. powered. Will dig 18″ to 24″ trench 5′6″ deep.

Write for Stock No. 456

ECA
EQUIPMENT CORPORATION OF AMERICA

CLIFTON HEIGHTS, PA., Box J-607, Sub. of Phila.
GROVETON, PA., Box 43-J, Sub. of Pittsb.
CHICAGO 4, ILL., 327-J So LaSalle St.
NEW YORK 7, N. Y., 30-J Church St.

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Latest list of used construction and industrial equipment. Shows PRICES and complete description. Send for your copy today.

SPECIAL

MICHIGAN C16 BACKHOE—$7650.00

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SERVICE SUPPLY CORPORATION

PILE DRIVING EQUIPMENT

VULCAN AND McKIERNAN - TERRY
Steam Pile Hammers and Extractors

- DROP HAMMERS
- DRIVING CAPS
- HOISTS AND BOILERS
- STEEL LEADS
- PILE DRIVER HOSE
- STEEL SHEET PILING

CONMACO, INC.

DRexel 1-3930
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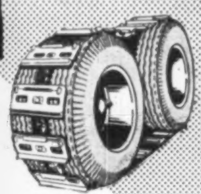

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Brandywine Valley Fabricators Inc .. 281
Browne & Associates, Floyd 277, 278

Clark Co., W. I., The 283
Coast Dredging Corp 280
Codell Construction Co 280
Conmaco Inc. 282

Davidson Pipe Co., Inc 282
Drachman Steel Corp., H. Y 283
Dyer Co., Inc., W. H 282

Earle Equipment Co., Inc 281
Equipment Corp. of America 281

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Mississippi Valley Equipment Co 282

O'Neill, A. J 280
O'Neill Construction Co., W. E 283

Pennsylvania, Commonwealth of 278
Perini Corp. 278

Ryan & Co., Phillip A 281

Seaboard Steel Corp 282
Service Supply Corp 281
Smith Inc., L. B 281, 283
Standard Steel Service Inc 280
Stanhope Inc., R. C 282
Swabb Eqpt. Co., Inc., Frank 280

Telephone Engineering 280
Truck Track Sales Co 283

U. S. Truck Sales Co 283

Valley Steel Products Co 282

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Wylie-Stewart Machy Co., Inc 283

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  American Brake Shoe Co. 14
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Armco Drainage & Metal Prod. Inc. .... 2nd Cover
Atlantic Steel Corp. 192
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  Baldwin Lima Hamilton Corp. 254-256
Autolene Lubricants 18-19
Automotive & Aircraft Div.
  American Chain & Cable Co. 183

Baldwin Lima Hamilton Co. Lima Div. 223
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Broderick & Bascom Rope Co. .... 4th Cover
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A. M. Byers Co. 209

J. I. Case 173
Caterpillar Tractor Co. 33-36
Chain Belt Co. 253
Cleveland Tramrail Div.
  Cleveland Crane & Engineering Co. 243
Clipper Mfg. Co. 259
Commercial Shearing & Stamping Co. 24
Concrete Reinforcing Steel Institute 194
Continental Motors Corp. 10

Dart Truck Co. 154
John Deere Ind. Div. 21
Deming Co. 132
Dorr-Oliver Co., Inc. 230
Dravo Corp. 242
DuPont DeNemours & Co. (Explosives) 17
Durajoint Technical Information 127

Economy Forms Corp. 192
Elgood Equipment Corp. 230
Euclid Div. GMC 152-153
Expansion Joint Institute 27

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Fairbanks Morse & Co. 3
Fate Root Heath Co. 177
Fennel Instrument Corp. of America 194
Fireman's Fund Insurance Companies 272
The Firestone Tire & Rubber Co. 32
Ford Motor Co. Industrial Engine Div. 246
Ford Motor Co., Truck Div. 69-92
L. B. Foster Co. 40
Franki Foundation Co. 320

Gahagan Dredging Corp. 234
Gar-Bro Mfg. Co. 175
Gardner-Denver Co. 191
Garrett Corp. 245
General Electric Co. 110-111
Goodall Rubber Co. 166-167
B. F. Goodrich Tire Co. 125-126

Gorman Rupp Co. 211
Granco Steel Products Co. 197
Graphic Systems 242
Greenhart (Demerara) Inc. 247
Griffin Wellpoint Corp. 244
W. & L. E. Gurley 195

Haloid Co. 141
Hamilton Kent Mfg. Co. 181
Hammond Iron Works 148
B. M. Heede, Inc. 234
Homelite Div., Textron, Inc. 120-121
Hose McCann Co., Inc. 222

Ideal Cement Co. 12
Ingersoll Rand Co. 196
Inland Steel Prod. Co. 265
Intercontinental Equipment Co., Inc. 176
Irvington Form & Tank Corp. 241

Jackson Vibrators, Inc. 184
Jaeger Machine Co. 251

Johns Manville Corp. 147
Johnston Pump Co. 228

Keuffel & Esser Co. 189
Kinnear Mfg. Co. 102
Koehring Co. 266-267
Kohler Co. 199

Larsen Products Corp. 142
Layne & Bowler Inc. 11
Layne & Bowler Pump Co. 20
Lead Industries Assn. 62
Lehigh Portland Cement Co. 135
LeRoi Div., Westinghouse Air Brake Co. 261
LeTourneau Westinghouse Co. 227; 229; 231; 233; 235; 237
Link Belt Speeder Corp. 30
Lipe-Rollway Corp. 32A
Lock Joint Pipe Co. 38
Loomis Machine Co. 194
Louisville Cement Co. 31

Macomber Inc. 119
Macwhyte Co. 249
Madsen Iron Works, Inc. Div. B-L-H 163
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Monarch Forge & Machine Works, Inc. 186
Monroe Calculating Machine Co. 59
Monsanto Chemical Co. 151
Moretrench Corp. 6-7
Morris Machine Works 99
Mueller Co. 26

National Clay Pipe Mfgrs. Co. 32C
National Steel Corp. Stran Steel Div. 13
New Departure Div. GMC 97
North American Aviation, Inc. 193
Northwest Engineering Co. 55

Patent Scaffolding Co. 128-129
Peele Co. 109
Peerless Pump Div
  Food Machinery & Chemical Corp. 215
Permagile Corp. of America 176
Pittsburgh Steel Prod. Co. 138-139
Plan Hold Corp. 232
Posey Iron Works, Inc. 268
Presstite-Keystone Engineering Products Co. 122

Ramset Fasteners Inc. 16
Raymond Concrete Pile Co. 178-179
Reproduction Engineering Corp. 200
Revere Copper & Brass, Inc. 143
Richmond Screw Anchor Co. 4
Ric Wil Co. 136
Rilco Laminated Products, Inc. 134
Ritko Products 271
H. H. Robertson Co. 8-9
John A. Roebling's Sons Corp. 221
Rolatape, Inc. 232
Russell, Burdsall & Ward Bolt & Nut Co. .. 131

Sauerman Bros., Inc. 216
Schlueter Mfg. Co. 228
Schramm, Inc. 263
Servicised Products Corp. 145
Shovel Supply Co. 262
Smith Engineering Works 15
Sparling Meter Co. 220
Spencer, White & Prentis, Inc. 107
Standard Dry Wall Prod. 146
Standard Steel Corp. 116
John W. Stang Corp. 219
Stanpat Co. 2
Sun Shipbuilding & Dry Dock Co. 29
Superior-Lidgerwood-Mundy Corp. 200
Symons Clamp & Mfg. Co. 22

Tectum Corp. 239
Templeton Kenly & Co. 180
Terry Contracting Inc. 247
Thew Shovel Co. 188
E. A. Thompson, Inc. 130
Thompson Pipe & Steel Co. 222
Timber Structures 190
Torrington Co. 32B

Townsend Co. 172
Truck Mixer Mfgrs. Bureau 224
Truscon Laboratories 174
Turner Halsey Co. 133

Union Metal Mfg. Co. 213
Unit Crane & Shovel Corp. 170
U. S. Steel Corp. 273

Viber Co. 171
Voss Belting & Specialty Co. 226
Vulcan Materials Co. 3rdCover

Warren-Knight Co. 150
Water Seals Inc. 115
Waukesha Motor Co. 185
Westinghouse Electric Corp., Apparatus. 201-204
Wheeling Corrugating Co. 113
Williams Equipment & Supply Co. 244
Wrought Washer Mfg. Co. 118

Professional Services 284-287

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

Employment Opportunities 277
Educational 279
Notices
  Proposal 274-276
Equipment
(Used or Surplus)
  (For Rent, Sales Wanted) 279-283
Advertisers' Index 287

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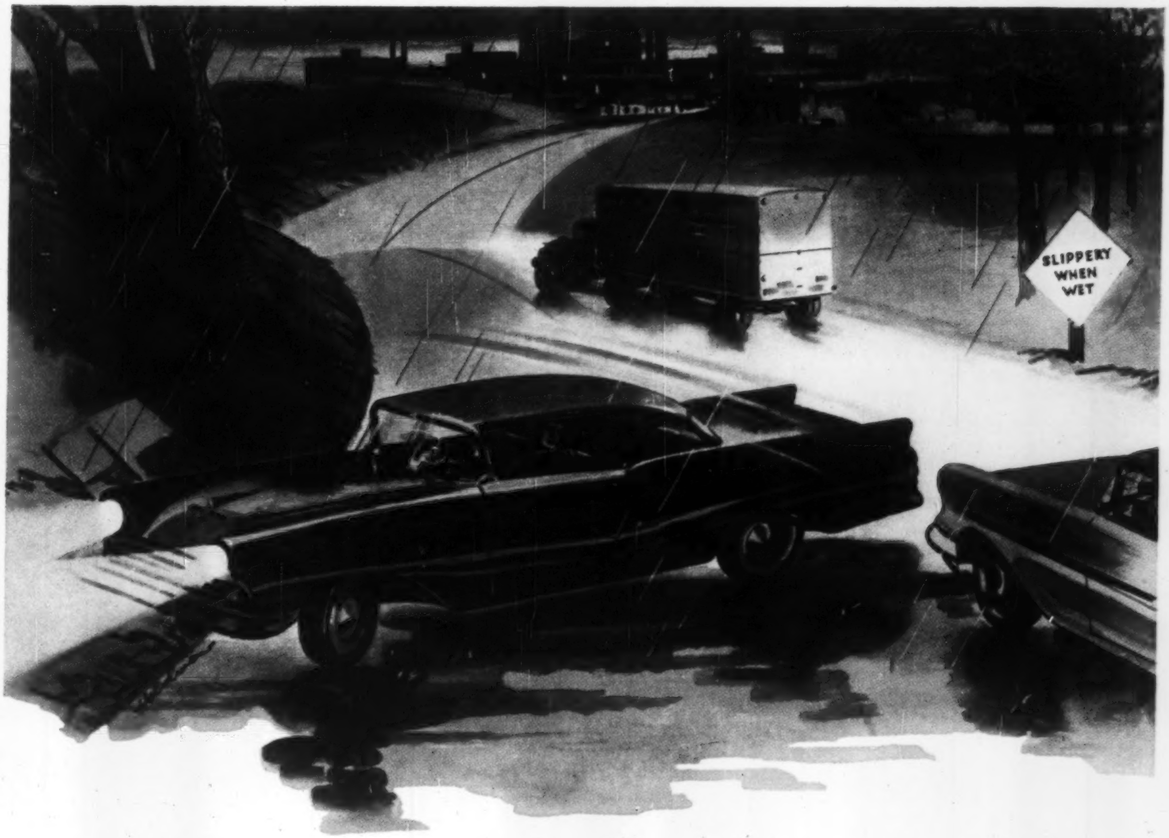

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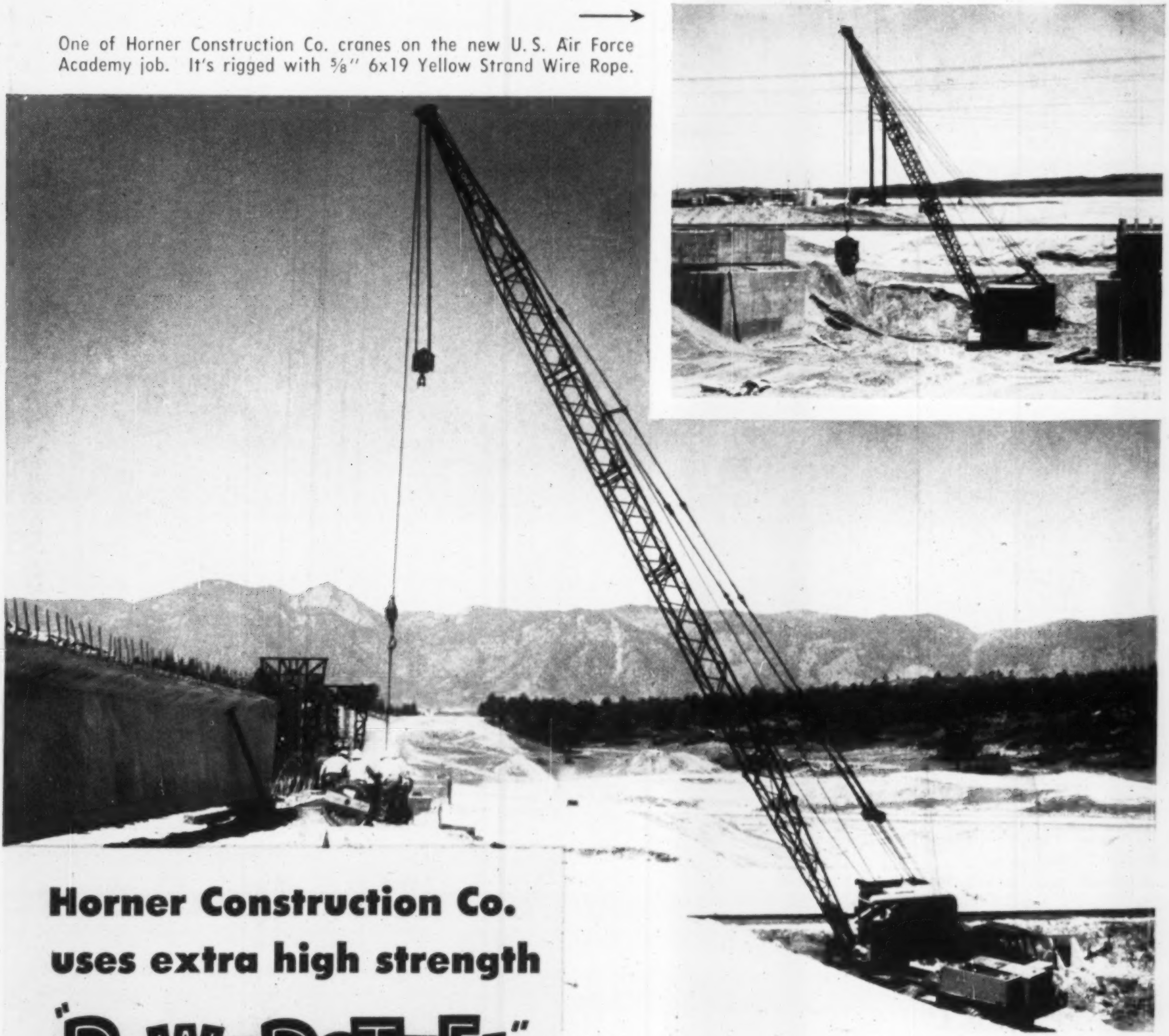

One of Horner Construction Co. cranes on the new U.S. Air Force Academy job. It's rigged with ⅝" 6x19 Yellow Strand Wire Rope.

Horner Construction Co. uses extra high strength "POWERSTEEL"® on Air Force Academy access bridge construction

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